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November 16, 1959 No. 23

ACCELERANT DYEING OF HYDROPHOBIC FIBERS–PRINCIPLES AND MECHANISMS

PIEDMONT SECTION

(concluded from November 2 issue)

EXPERIMENT V——— DYEING OF CARRIER-PRETREATED FABRIC

If the mechanism of carrier action is one in which the internal compact structure of the fiber is loosened by swelling, this opening of the fiber structure may be retained on pretreatment of fabric followed by washing out of the carrier. In the case of secondary cellulose acetate, pretreatment with triethyl phosphate at 80°C followed by washing to remove the water-soluble accelerant to .05% PO_4 content gives a fiber with increased dyeing rate. Recently an English patent has claimed pretreatment of polyester fabric with dioxane followed by washing, whereupon the polyester shows increased dyeing properties.

Pretreatment of cellulose triacetate with water-soluble diethylene glycol diacetate has been reported (*19*) to yield fabric with increased dyeability in new dyebath.

If the mechanism of carrier action using water-insoluble carriers is the same as that of water-soluble carriers of established swelling action, pretreated Arnel or Dacron should retain its improved dyeability in new bath. To this end, the following experiments were designed and carried out.

Procedure

Comparative dyeings were made at 95°C for two hours at liquor ratio of 25:1. Butyl benzoate for Kodel and ortho-phenyl phenol and methyl salicylate for Dacron were used as carriers for pretreatment and for dyeing at 95°C. Scouring procedure involved a double scouring with four grams per liter of nonionic ethylene-oxide-phenol adduct at 90°C for 30-minute cycles.

a) Fabric prescoured—no carrier
b) Fabric pretreated with carrier then scoured
c) Fabric dyed in presence of carrier in concentration equivalent to that used for pretreatment.

Visual comparison of shades with estimation of depths relative to method "c" as arbitrary standard of 100 is given in Table XV.

Discussion

1) The overall conclusion obtained is that carrier must be present in the dyeing system for maximum accelerant action. Fabric dyed in presence of carrier gives heavier shades than pretreated fabric, while carrier-pretreated fabrics show greater dyeability than control (no carrier) as represented in Table XV.

2) Previous investigators who have noted a carry-over of accelerant activity on carrier-pretreated fabrics have not considered the appreciable percentage of carrier absorbed by the fiber and tenaciously held even with scouring cycle. The absorption data for carriers is noted in Experiment II.

3) The accelerant effect of fabrics pretreated with carrier is of a degree that would be expected if smaller quantities of carrier were used. The estimated retention of carrier after the scourings would still leave two to three percent of carrier in the fiber. In the dyebath, a new equilibrium would be formed with redistribution of carrier between fiber and bath.

4) Practical observations are that dyebaths which have lost carrier through volatilization must have effective concentration renewed by addition of new carrier.

EXPERIMENT VI——— APPARENT SPECIFIC GRAVITIES AS A MEASURE OF SWELLING PROPERTIES OF CARRIERS

The technique of specific gravity measurements of fibers in various mediums has been reported by Fortess (*18*) as a tool for showing whether the medium penetrates or swells the fiber. In view of the question as to whether carrier action is due to swelling, the technique has been applied to two accelerants of different nature—trichlorobenzene and methyl salicylate, as well as water. Cellulose triacetate and polyester fibers were used.

TABLE XV

Effect of pretreatment on subsequent dyeing

3% CI Disperse Blue 27—two hours at 95°C

	Visual Depth
Kodel	
Control	30
Pretreatment 6% butyl benzoate	40
Pretreatment 12% butyl benzoate	50
Dyed in presence of 6% butyl benzoate	80
Dyed in presence of 12% butyl benzoate	100
Dacron	
Control	20
Pretreatment with 6% ortho-phenyl phenol	45
Pretreatment with 12% ortho-phenyl phenol	60
Dyed in presence of 6% ortho-phenyl phenol	75
Dyed in presence of 12% ortho-phenyl phenol	100
Pretreatment with 6% methyl salicylate	50
Pretreatment with 12% methyl salicylate	65
Dyed in presence of 6% methyl salicylate	75
Dyed in presence of 12% methyl salicylate	100

TABLE XVI
Specific gravities of Arnel and Dacron in water, trichlorobenzene and methyl salicylate

	Arnel	*Dacron*
Water		
Sp gr 25/4°C	1.3315 — 1.3306	1.3887 — 1.3895
Sp gr 80/4°C	1.2800 — 1.2842	1.3665 — 1.3659
Sp gr 25/4°C after being heated at 80°C for two hours	1.3211 — 1.3234	1.3905 — 1.3915
Trichlorobenzene		
Sp gr 25/4°C	1.2859 — 1.2866	1.3827 — 1.3822
Sp gr 80/4°C	1.2254 — 1.2618	1.3535 — 1.3662
Sp gr 24/4°C after being heated at 80°C for two hours	1.3087 — 1.3080	1.4064 — 1.4051
Methyl Salicylate		
Sp gr 25/4°C	1.3096 — 1.3087	1.3825 — 1.3862
Sp gr 80/4°C	1.2180 — 1.2134	1.3014 — 1.2899
Sp gr 24/4°C after being heated at 80°C for two hours	1.3409 — 1.3422	1.4137 — 1.4174

TABLE XVII
Shrinkage of Dacron in carrier baths

Carrier type	*Active carrier g/l*	*Shrinkage %*	*Shrinkage Starts (°F)*	*Shrinkage Stops (°F)*
None	—	4—5	170	212
o-phenyl phenol	5	18—20	130	170
o-phenyl phenol	2.5	10—11	150	180
Methyl salicylate	7.5	12	150	190
Methyl salicylate	3.75	11.5	150	190
Methyl salicylate	1.825	8	150	190
Trichlorobenzene	9.0	11	160	190
Trichlorobenzene	4.5	11	160	190
Trichlorobenzene	2.25	11	160	190
None (pressure dyeing) at 260°F	None	11—12	—	—

Procedure

Determination of Apparent Specific Gravity.

1) 50-ml pycnometer with thermometers and side-arm volume adjusting tubes were used and their dry tare weight determined.

2) Each pycnometer was filled with distilled water and placed in a constant temperature bath at 25°C and allowed to come to thermal equilibrium as indicated by the pycnometer thermometer. The volume of water in the pycnometer was kept constant during equilibrating by adding to or removing excess water from the adjusting tube. At this point the pycnometer was removed from the bath, wiped clean with an acetone damp cloth and weighed. The volume of the pycnometer was then determined by dividing the weight of water it contained at these conditions by the specific gravity of water at 25°/4°.

3) Procedure No. 1 was repeated at 80°C to determine the volume at that temperature.

4) Procedure No. 2 was repeated at both 25°C and 80°C using both trichlorobenzene and methyl salicylate to determine their specific gravities at both temperatures.

5) Pycnometers were half filled with previously carbon-tetrachloride-extracted Arnel or Dacron. Two pycnometers were used for each yarn. The pycnometers with the yarns were oven dried for four hours at 110°C to obtain the dry weight of the yarn sample.

6) After the weight of the pycnometer plus the yarn sample was obtained, the liquid medium (trichlorobenzene, methyl salicylate, or water) was added to the pycnometer containing the yarn sample. The yarn soaked in liquid inside the pycnometer was probed with a glass stirring rod and alternately vacuumed to remove the occluded air bubbles. When all air had been displaced, the pycnometer was brought to equilibrium at 25°C and weighed. The probing, vacuuming, and weighing was repeated until a constant weight was obtained.

7) Procedure No. 6 was repeated at 80°C and held at this temperature for two hours.

8) After completion of Procedure No. 7, Procedure No. 6 was again repeated at the 25°C temperature equilibrium.

9) The following information was obtained from the foregoing procedures and is summarized in Table XVI.

a) Volume of pycnometer at 25°C (assuming water at 4°C to have density of 1).
b) Specific gravity of trichlorobenzene and methyl salicylate at 25°/4°C.
c) Specific gravities of Arnel and Dacron in both trichlorobenzene and methyl salicylate at 25°/4°C and 80°/4°C.
d) Specific gravities of Arnel and Dacron in both trichlorobenzene and methyl salicylate at 25°/4°C after being heated to 80°C for two hours.

Specific Gravities of Mediums Used.

Water	25/4°C	= 0.99707
	80/4°C	= 0.97183
Trichlorobenzene	25/4°C	= 1.45184
	80/4°C	= 1.38762
Methyl Salicylate	25/4°C	= 1.17656
	80/4°C	= 1.12755

Formula used for determining Specific Gravity of yarn in various liquid mediums:

$$\text{Sp gr} = \frac{\text{W x sp gr of medium of given temp}}{(\text{b} - \text{C} + \text{W})}$$

where W = wt of yarn sample
b = wt of pycnometer filled with medium at given temperature
C = wt of pycnometer with yarn sample filled with medium of given temperature.

Discussion

1) The apparent specific gravity values show whether liquid medium penetrates the fiber. Thus, on secondary acetate, mineral oil shows low specific gravity, whereas penetrating solvents usually with some swelling or solvating action tend to give higher values. The higher the value the greater the penetration or swelling.

2) This technique applied to carrier materials used shows significant differences in values between the trichlorobenzene and methyl salicylate. This would indicate that methyl salicylate shows greater penetration and may have some solvating effect.

3) Water is shown to penetrate both fibers. Penetration of Arnel is more pronounced with carrier materials than Dacron.

4) The products used are not strong swelling agents or plasticizers for the fibers. Further work should be with materials with known solvating action for either cellulose triacetate or polyester fiber.

5) The specific gravity data shows that trichlorobenzene cannot be classed as a swelling agent and is, in fact, poorer than water alone. However, this material is an efficient carrier. The conclusion is that it is not necessary for carriers to show swelling properties.

EXPERIMENT VII——— EFFECT OF CARRIERS ON SHRINKAGE OF FIBERS

Although it has not been possible to demonstrate swelling of polyester fibers in carrier solutions, it is well recognized (*1,9*) that considerable shrinkage of yarn or fabric occurs during practical dyeing with carriers at elevated temperatures. Laboratory studies with single yarns have been conducted which demonstrate this effect under controlled conditions. The procedure used for these determinations is as follows:

Procedure

Shrinkage of Yarn. Single yarns or fibers are suspended under controlled tension in a process medium contained in a calibrated, graduated, cylindrical vessel immersed in a temperature-controlled bath. Periodic measurements of yarn or fiber length are made during processing by observation through the vessel wall.

Using the above procedure, the longitudinal shrinkage of a 70-denier, 34-filament Dacron yarn was studied under a tension of 0.029 grams per denier in baths containing three carrier types (o-phenyl phenol, methyl salicylate, and trichlorobenzene) at several concentrations. Carrier dyebaths were prepared in the manner recommended by the manufacturer. Tests were run in the presence and absence of dyestuff. Measurements of yarn length were made at 10° intervals as the temperature of the bath was raised through the dyeing cycle from 80-212°F. Good agreement was obtained in repeat tests and the results given in Table XVII represent averages of several studies. The data are shown in condensed form as calculated from the original measurements.

Discussion

1) All the carriers tested caused a greater shrinkage than does water under the same conditions. With carriers present, shrinking started at 130-160°F and reached a maximum at 170-190°F, while in water no shrinkage was observed below 170°F. In water alone, shrinkage approached four to five percent at 212°F and 11-12% at 260°F (pressure dyeing).

2) With carriers present, the percent shrinkage varied with the type and concentration. Even low concentrations were sufficient to increase the percent shrinkage to that observed under pressure-dyeing conditions. With ortho-phenyl phenol, a considerable increase in shrinkage occurred with higher carrier concentrations; with methyl salicylate, very little change occurred as the carrier concentration was raised; and with trichlorobenzene, 11% shrinkage was obtained at concentrations from two to nine percent carrier.

3) It seems significant that conditions producing a shrinkage of at least 10-12% are also conducive to good dyeing rates on Dacron. However, this cannot be construed to show that the two phenomena are necessarily interdependent.

4) Longitudinal shrinkage of the extent observed should produce a five to 10% increase in apparent density of the fiber unless accompanied by an equivalent lateral expansion or swelling. Unfortunately no specific gravity measurements of yarns were made after such treatments. However, it is interesting to note that in Experiment VI, the change in specific gravity after two hours at 80°C (176°F) was much smaller.

5) Of interest is the comparatively low temperature at which shrinkage occurs which would indicate substantial absorption. In dyebaths, carrier absorption at 80°C would precede dyeing at 205°F (95°C).

EXPERIMENT VIII——— EFFECT OF CARRIER ON RATE OF NITROSATION OF CI DISPERSE BLUE 3

Hydrophobic fibers have been characterized as being compact in their internal structure. Experiments to demonstrate greater accessibility and increased diffusion due to carrier were required. Actually, the simplest demonstration of increased accessibility due to use of carrier is the dyeing method. From the standpoint of the physicist examining solid states, the data on dyeing rates would be cited as evidence of greater accessibility.

Microscopic cross sections of dyeings in presence or absence of carriers show quite definitely the increase in diffusion rate where carrier is present. This behavior has been reported in the literature and does not require confirmation or further demonstration. ICI handbook, "Dyeing of Polyester Fibers", shows photographs of cross sections where ring dyeing is characteristic of dyeings without carrier. Where carrier is present, there is complete penetration. Similar behavior on cellulose triacetate has been described by Fortess (*8*).

Penetration rate of nitrous acid on carrier-treated and noncarrier-treated fabrics was chosen as an experimental approach to measurement of accessibility.

It is known that diazo black bases dyed onto cellulose triacetate diazotize at a slower rate than on secondary acetate. On Dacron, diazotization rate is much lower.

The rate of nitrosation of CI Disperse Blue 3 (1-4 dialkyl amino anthraquinone) from blue to red afforded a direct and a visual method for demonstrating the pentration rate of nitrous acid.

Procedure

Both Arnel and Dacron were dyed at 95°C with 1% of CI Disperse Blue 3, using four gpl of butyl benzoate as carrier at a 30:1 liquor ratio. Carrier was removed by scouring followed by drying at 150°C for 15 minutes.

Each fabric was divided into two parts. One part was treated in water containing one gpl of Igepon T at 95°C for one hour. The other part was treated with carrier—four gpl of butyl benzoate for one hour at 95°C.

The comparative rate of nitrosation was determined in a nitrous acid bath prepared with four gpl of sulfuric acid 66° Bé and three gpl of sodium nitrite. For Arnel, temperature used was 20°C. For Dacron, higher temperature of 70°C is necessary to give changes in reasonable time. Fabric with and without absorbed carrier was placed in nitrous acid bath. Samples were taken out at five-minute intervals, neutralized in dilute ammonium hydroxide and allowed to air dry in the dark.

The color changes are based on estimates of percent change from original blue to red nitroso shade.

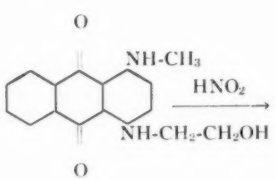
Curves in Figure 8 show the relative rates on both Arnel at 20°C and on Dacron at 70°C comparing carrier-treated fabrics with control.

Discussion

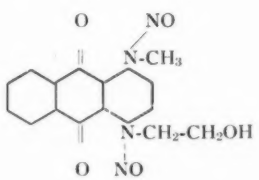
1) The rate of diazotization or nitrosation would be dependent on the permeability of the fiber and the mobility of the nitrous acid ions. Generic comparison of rate on secondary acetate, Arnel and Dacron at 20°C is in the ratio of 1-10-200.

2) Arnel and Dacron did not show the same behavior with respect to the effect of carrier treatment on rate of nitrosation. The rate of nitrosation is measured by the visual change of the blue 1-4 dialkyl amino anthraquinone dye to its red nitrosation product.

Arnel changed at essentially the same rate whether carrier treated or wet out with water and surfactant. At 20°C, using four gpl of sulfuric and three gpl of sodium nitrite, change required 20 minutes, whereas



Blue



Red

secondary acetate changed in less than five minutes.

Dacron, however, showed distinct increase in nitrosation rate for the carrier-treated fabric, as shown in Figure 8. It required 70°C for appreciable change to take place. Carrier-treated Dacron at 20°C still showed only slight change at one hour.

3) The interpretation of these results brings out the following points: Cellulose triacetate (Arnel) is a fiber of intermediate hydrophobicity. It shows water imbibition as indicated in Experiment IX to a higher degree than polyester fiber. With nitrous acid ions of smaller size and high mobility and already a fiber of moderate accessibility, the effect of carrier in opening up structure is not demonstrated. However, it should be clearly pointed out that the carrier did not bring the rate of nitrosation up to that of secondary acetate. Where dyes are used with larger molecular weight and slower mobility, the use of carrier does bring the dyeing rate up to that of secondary acetate.

In the case of Dacron, which is of more compact structure, the increased rate of nitrosation could be attributed to greater accessibility. Further work is needed for interpretation of this behavior using inorganic acids on fabrics dyed with colors showing acid-base change.

EXPERIMENT IX——— IMBIBITION OF WATER IN PRESENCE AND ABSENCE OF CARRIER

The very term "hydrophobic fiber" identifies cellulose triacetate and polyester as fibers which imbibe lower percentages of water. Figures taken from the *Textile World's* Synthetic Fiber Table for a range of fibers demonstrate this point quantitatively:

	Moisture Regain at 65% RH	*Imbibed H_2O at 95% RH*
Cotton	7.0%	16.0%
Rayon	13.0%	27.0%
Secondary acetate	6.0%	14.0%
Cellulose triacetate	3.2%	—
Dacron	0.4%	0.5%
Orlon	1.5%	2.5%

Their reputation for quick drying is based on their low pickup of water. Since dyeing takes place from the disperse dye in its water solution, the low pickup of water within the fiber from the dyebath has been advanced as the major factor for low dyeing rate of hydrophobic fibers. Increase in dyeing rate should be obtained if presence of carrier resulted in greater imbibition of water. The net result would be faster dyeing rate because of greater availability of dye liquor. If quantitative data on the water imbibed in Arnel and in Dacron showed marked increase in water imbibition over fibers treated in absence of carrier, this would be substantiation of this theory of carrier action. Such data have not been published and techniques were required to obtain this information.

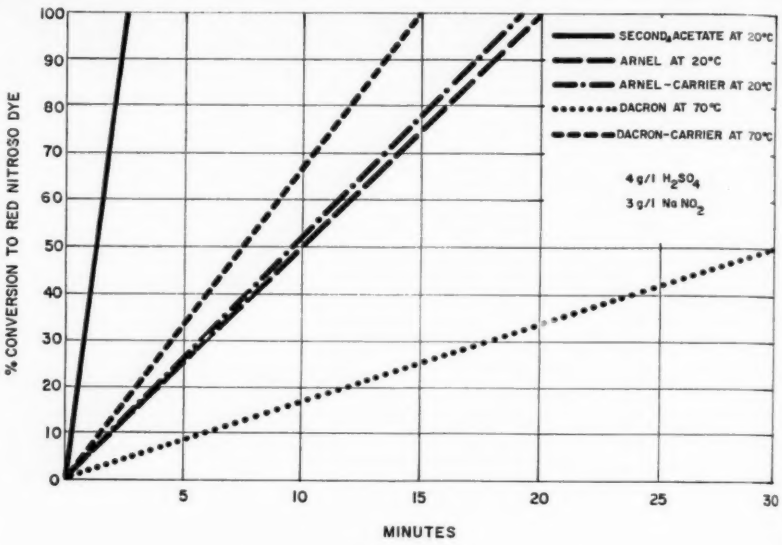


Figure 8
Effect of carrier on rate of nitrosation

The actual quantity of water present could be obtained in three ways from fabrics treated in presence and absence of carrier:

a) Subtraction of known carrier present from total using quantitative chemical analysis as shown in Experiment II;
b) Loss of water on placing fabric in a dessicator containing calcium chloride;
c) Determination of water by Karl Fischer titration (fabric is shaken with methanol for three hours and water content determined by Karl Fischer titration method for water).

Procedure

Fabrics of cellulose triacetate or spun Dacron of known bone-dry weight were treated in closed Launder-Ometer cans in a) water containing detergent, and b) in water containing emulsified carrier at 95°C for one hour. Samples were then rinsed at 40°C for 30 seconds and subsequently centrifuged at 1600 rpm for 15 minutes. Carriers used were tripropyl phosphate, trichlorobenzene and ortho-phenyl phenol. Fabrics were then conditioned by standing over water (dessicator) at 25°C for 48 hours whereby imbibition equilibrium was established. The samples were then weighed without opportunity for further change in water content. The increase in weight represents both that of absorption of carrier (see Experiment II) and of water imbibed. Water content of the trichlorobenzene samples was by Karl Fischer method "c". With orthophenyl phenol and tripropyl phosphate, method "b" was used.

Discussion

1) The bone-dry weight was obtained on parallel fabrics dried at 110°C for one hour. The water content of fabrics used was 2.33% for Arnel and .303% for Dacron.

2) It is clearly shown that, in case of cellulose triacetate, water content of the fabrics treated with carrier is essentially the same as the control.

3) It is also shown that carrier-treated Dacron does not show a pronounced increase in water content over noncarrier-treated Dacron.

4) The quantity of carrier present as obtained by subtraction is the same as the quantitative data given in Experiment II.

5) Although ortho-phenyl phenol is hydrophilic and might be expected to attract water, trichlorobenzene is hydrophobic and would not show this attraction for water.

6) The experimental data do not support the theory of increased imbibition of water as the basis for carrier action.

TABLE XVIII
Effect of absorbed carrier on water imbibition

Sample number	Fabric	Closed system 95°C for one hour—Dyebath— 30 x 1 volume	Percent pickup (water & carrier)	Water imbibition	Differ carrier %
1	Arnel	0.5 g/l Igepon T Gel	9.01%	8.44%	
2	Arnel	4.0 g/l Tripropyl phosphate emulsion	12.46%	8.34%	4.12%
3	Arnel	5.0 g/l Trichlorobenzene emulsion	11.33%	9.25%	2.08%
4	Dacron	0.5 g/l Igepon T gel	1.59%	1.63%	
5	Dacron	5.0 g/l Trichlorobenzene emulsion	6.79%	1.78%	4.78%
6	Dacron	5.0 g/l Ortho-phenyl phenol emulsion	6.82%	2.01%	5.04%

EXPERIMENT X——— TRANSFER OF DYE FROM CARRIER FILMS

The film theory of carrier action states that the carrier concentrates on surface of fiber as a thin layer. The dye dissolves in this film, giving a higher concentration of dye than would be present in the dyebath. Transfer of dye to the fiber is believed accelerated from the film which offers its dye at a higher concentration. The question of whether dye transfers through mechanism of a) solution in water, b) solvent dyeing, or c) direct absorption of carrier by the fiber, taking with it dissolved dye, has not been resolved. The following experiments were designed to show—

1) the partition of dye between carrier and fiber
2) the effect of water on dye transfer
3) solvent dyeing as related to carrier action.

Procedure

A) *Dye Transfer to Dacron from Methyl Salicylate.* Samples of spun Dacron were dried at 90°C for one hour, weighed, and placed in a dessicator over calcium chloride to maintain the low water content.

Pad Baths were prepared as follows:

1) Anhydrous carrier bath (Dye to carrier ratio equal to ±3)
   82 parts methyl salicylate
   10 parts nonionic surfactant (long-chain phenol-ethylene oxide)
   8 parts CI Disperse Blue 27 (disperse powder)
   ——
   100 parts
2) Anhydrous carrier bath
   85 parts methyl salicylate
   10 parts nonionic surfactant
   5 parts CI Disperse Blue 27 (disperse powder)
   ——
   100 parts
3) Hydrous carrier emulsion
   95 parts commercial methyl salicylate emulsion containing approximately
      50 parts methyl salicylate
      10 parts nonionic surfactant
      40 parts water
   5 parts CI Disperse Blue 27 (disperse powder)
   ——
   100 parts

The fabrics were padded on a laboratory padder at 25°C, using one dip, one nip at 32 pounds pressure. Immediately after being padded, the samples were weighed and showed a pickup of approximately 65% for the anhydrous samples and 50% for the emulsions. (The difference in pickup is caused by the greater proportion of high-density methyl salicylate 1.18 g/cc).

The samples were placed between glass plates in an AATCC Perspirometer under ten pounds pressure and put in an oven at 95°C for one hour. (This method was chosen to prevent rapid evaporation of carrier and to insure optimum conditions for migration of the dye from the carrier film into the fiber). After removal from the oven, a sample was taken and the remaining cloth given a cold rinse until clear, followed by a 10-minute scour at 60°C with one g/l Tamol N, for removal of surface dye and carrier.

B) *Transfer to Arnel and Dacron from Methyl Salicylate and Trichlorobenzene.* Fabrics of Arnel and Dacron were dried to remove water. Padding was at 80°C and dye transfer was carried out at 95°C.

4) 95 parts of trichlorobenzene
   5 parts of CI Disperse Blue 27 (disperse powder)
5) 95 parts of methyl salicylate
   5 parts of CI Disperse Blue 27 (disperse powder)

Discussion

1) On Dacron, the migration of CI Disperse Blue 27 dye at 95°C from the carrier film is quite low. With known pickup of pad liquor, complete absorption should have given shade expected of 3.0-5.0% dyeings. The actual transfer gives only the depth of shade expected from .1-.15% dyeing. With water present, some increase in dye transfer to that of .2% dyeing standard is noted but major portion of the dye is still retained by the carrier in the external phase.

2) The results on Dacron using CI Disperse Blue 27 show that dye is held by the carrier film. This is understandable in view of the solubility of dye in carrier (10.4% as oil color). Direct absorption of methyl salicylate by Dacron from anhydrous film, taking with it dye, did not take place. The behavior on Dacron does not support the film theory. It also suggests that carrier is absorbed from its water solution in the dyebath.

3) The results on Dacron indicate that partition coefficient of dye between carrier film and fiber is very much in favor of the carrier. Under these conditions dyeing of the Dacron by transfer from carrier film would not be expected.

4) For Experiment X(B), methyl salicylate and trichlorobenzene were chosen as representative of carrier materials with differences in "swelling" properties. Trichlorobenzene can be used even for secondary acetate without shrinkage and plastification whereas methyl salicylate shows definite swelling properties. The data from Apparent Specific Gravities in Experiment VI further differentiates these materials.

5) The differences in dye pickup between methyl salicylate and trichlorobenzene on Arnel are striking. Actually, depth of shade was immediately obtained on Arnel using methyl salicylate, indicating solvent dyeing. On the other hand, trichlorobenzene showed essentially no solvent dyeing or dye migration on heating for either Arnel or Dacron.

6) The pertinent observation is that swelling properties are not necessary for carrier action. This is shown by trichlorobenzene, a product of limited "swelling" properties.

7) The behavior of methyl salicylate on Arnel shows that absorption of this material can take place by direct penetration. For Dacron this mechanism is much less evident.

TABLE XIX

Dyeing from carrier films—Visual shade depth*

	Dacron	Arnel
(1) CI Disperse Blue 27 Methyl salicylate No H_2O (10% dye conc)	.15% dyeing	
(2) CI Disperse Blue 27 Methyl salicylate carrier No H_2O (5% dye)	.10% dyeing	
(3) CI Disperse Blue 27 Methyl salicylate carrier H_2O present (5% dye)	.20% dyeing	
(4) CI Disperse Red 35 Methyl salicylate	.15% dyeing	3.3%
(5) CI Disperse Red 35 Trichlorobenzene	.05% dyeing	0.1%

* Shade depth given in terms of comparative depth from aqueous dyeing standards.

DISCUSSION

APPLICATION OF EXPERIMENTAL RESULTS TO PROPOSED MECHANISM OF CARRIER ACTION ———The theories of carrier mechanisms divide themselves into two categories: a) the action of the carrier as a factor in the dyebath, and b) the action of the carrier within the fiber. The theories of action outside the fiber are dye solubilization, transport, and film theories.

Dye Solubilization Theory. The critical factor in dyeing rate is the transfer of dye from its water-insoluble particle in the dyebath to the water aqueous solution. Bird (*16*) shows that many of the dyes used in the dyeing of hydrophobic fibers have low solubility in water to the extent of a range of five to 100 milligrams of dye per liter.

With increase in solubility of dye in the aqueous phase, the rate of dyeing would be expected to increase. The carrier is an excellent solvent for dye. The data in Experiment I shows this solubility to range from two to 30% depending upon the dye or the carrier. From the solution of the dye in dispersed or emulsified carrier, the rate of transfer of dye to the water solution would be expected to increase.

The increased solubility and transfer of dye to the water phase may contribute to dyeing rate for those dyes which have extremely poor solubility in water. However, this mechanism of carrier action does not appear to be a major factor in carrier function. This is based upon the following experimental observations:

1) A considerable variation exists between individual dyes and carriers in their solubility. One might expect tripropyl phosphate, which has high solubilization action on CI Disperse Yellow 37, to be considerably more effective than trichlorobenzene, which shows low solubility as a carrier for this particular dye. The facts are that the trichlorobenzene and tripropyl phosphate have the same carrier action and dyeing rate for this particular dye. The marked differences in solubility of dye in carrier do not result in marked differences in accelerant action on Arnel.
2) The lack of correlation between solubility of dye in carrier and dye exhaustion, Table II, can be cited as evidence against the solubilization theory.
3) Tripropyl phosphate is an excellent solvent for many dyestuffs. Although it has a good accelerant action on cellulose triacetate, it has practically no accelerant action for dyeing of polyester fibers. If solubility or increased solubility of dye in water were the major functions of the dyeing accelerant, tripropyl phosphate would be a very useful carrier for polyester fibers. The fact that it is of no value as a carrier whatsoever negates the theory of carrier action respective to solubilization of the dye.

Transport Theory. This theory was one of the first advanced and is essentially the basis for first naming of the accelerant materials as carriers. It states that the dye forms a complex with the specific chemical compound and this product of mutual solubility is absorbed by the fiber more easily than the water solution of dye and with the dye in greater concentration per unit volume of dye liquor. This mechanism was based on the observations that a) the accelerants do dissolve the dyes, and b) that the accelerants are absorbed by the fiber, whence the transport or carrier theory logically followed.

The following factors make the transport theory unacceptable:

1) Since accelerants are of lower molecular weight, they are more readily absorbed and have higher mobility within the fiber. A loose complex of dye and accelerant would be larger than that of dye molecule itself and would be of lower mobility.
2) Whereas products containing phenol, ester, alcohol, or ketone groupings might be expected to form products held by hydrogen bonding, etc (in terms of modern solution theories, possess cohesive energy) other products such as napthalene, biphenyl and trichlorobenzene without dipole moment and with lower tendency to hydrogen bonding show equally good accelerant action.

Film Theory. The film theory is based upon the experimental observations that carrier particles are found to an appreciable extent upon the surface of the fabric or the individual fibers. This has been shown graphically by Millson (*10*) in his Microdyeoscope films. The presence of surface carrier as film is shown to a limited extent in well-dispersed carrier systems in the quantitative data on absorption of tripropyl phosphate (Experiment II). The formation of a film of ortho-phenyl phenol is visually observed when polyester fiber dyed black is placed in a bath containing ortho-phenyl phenol at temperatures below the boil. Visual migration of the ortho-phenyl phenol to the surface of the black Dacron fabric affords a striking demonstration of formation of film of carrier on the fiber. Film is also indicated by drycleaning of hydrophobic fibers in early stages of dyeing where the surface film contains considerable dye.

It is known that the dye dissolves in the carrier film. The carrier film contains a higher percentage of dye than the aqueous dyebath. In this more concentrated form, dyeing rate would be expected to increase by virtue of greater dye availability. There could also be a solvent dyeing of the fiber, which could give further chance for increase in dyeing rate.

The film theory is not supported by the facts as obtained from the experiments set up to prove or disprove its validity:

1) In the investigation on migration of dye from carrier film in Experiment X, the transfer of dye from solvent film containing high concentration of dye is low. The partition coefficient favors the 100% carrier material rather than the fiber. Practically, dye in the carrier film would be retained by the carrier. This explains why globules of carrier on fiber surface did not give overdyed spots at these points as shown by Millson in his Microdyeoscope films.
2) Tripropyl phosphate is a film former. It is not, however, a carrier for Dacron.
3) Trichlorobenzene dye films as shown in Experiment X show essentially no migration of dye to the fiber, whether Arnel or Dacron. This demonstrates that trichlorobenzene film does not penetrate the fiber. Methyl salicylate shows dye transfer to only a limited degree on Dacron. This behavior checks with that from apparent specific gravities of Experiment VI, where trichlorobenzene shows much lower penetration of the fibers—Arnel or Dacron.
4) Presence of water in the carrier does give some increased dye transfer, but the partition coefficient from carrier film containing water on Dacron still favors the carrier.

Once the focus of attention has been shifted from the accelerant as functioning outside the fiber to a function inside the fiber, the mechanism becomes one of carrier working in a variety of ways within the fiber. These are:

a) Carrier becomes attached to fiber with hydrophilic portion free. This system would act by increasing the imbibition for water and dye liquor.
b) Carrier replaces intermolecular bonds of the solid gel structure characteristic of fibers. The weaker bonds are more readily broken whence molecule is more open. This permits 1) greater lubricity, ie, fiber molecules tend to slide over each other and dye liquor has greater change of penetration and 2) greater opportunity for accessibility through more frequent openings as the segments of fibers vibrate.
c) Carrier is absorbed within fiber and by means of its solvent action tends to swell fiber. With increased swelling, dyeing rate is increased.
d) Carrier acts as liquid fiber and is dyed more readily than fiber itself, giving a higher concentration of dye which by solvent interchange gives more rapid dyeing. This theory also predicts that exhaustion or saturation value will rise where carrier is present in fiber.
e) Carrier penetrates into areas not available or accessible, effectively increasing the number of areas available for dye pickup.

Each theory of mechanism of carrier action has been examined critically and key experiments designed to prove or disprove its validity.

Water Imbibition Theory. The theory based on greater imbibition of water and therefore greater flow of dye liquor has been examined in Experiment IX. The data shows no marked change in quantity of water absorbed when carrier is present in fiber. With competition in internal sites between carrier and water, there is theoretically a possibility that water content might be less.

Furthermore, such hydrophobic products as biphenyl and trichlorobenzene do not possess hydrophilic groups. These products are excellent carriers and are known to be absorbed by the fiber. They would not be expected to increase pickup of water. These experiments tend to disprove the imbibition theory.

Liquid-Fiber Theory. The concept of carrier acting as an auxiliary "cofiber", which is also dyed, has been examined in the face of the factual observations.

Using trichlorobenzene as the carrier, the quantity of product absorbed within the fiber is approximately 3.0-3.5 from concentrations of 10% on fabric weight usually used (Experiment II). The solubility of many of the critical dyes will range from two to five percent in the trichlorobenzene assuming saturation and even allowing for greater solubility at 95°C versus known values at 80°C (Experiment I). The total dye content for this carrier will approximate 0.5% on fabric weight. This quantity does not explain the increase in percent exhaustion using carrier at dyeing times of one to two hours. Furthermore, no pronounced differences in exhaustion are noted between carriers in which dye has widespread solubility (Table III). An additional argument against the "liquid fiber" is that washfastness and possibly drycleaning would be considerably lower from this medium which is not irreversibly held within the fiber.

MECHANISM OF ABSORPTION OF CARRIER———Fundamental to study of carrier mechanism is the manner in which carrier is absorbed. Does the carrier become dissolved in water and then attach itself to the fiber molecule by the same mechanism as dyeing mechanism of disperse dyes, or does the carrier work as well by pickup as an oil particle and go directly to the fiber, eliminating the need for going through water-solubility phase?

The data on exhaustion of carriers shows that a large percentage of the carrier present is within the fiber. The tenacity with which these are held suggests that the carriers are absorbed by the fiber and are attached to the fiber by electrical forces similar to those which hold dyes to fibers. The mechanism appears to be by solubilization in the water and diffusion into the fiber from water solution.

Experiment X on dye migration from carrier films demonstrates that direct penetration of carrier is not likely, especially when carrier is one like trichlorobenzene, which has no swelling or solvating effect on fiber.

Empirical evaluation of carriers as reported by several investigations show that optimum water solubility is advantageous. Where carrier is too water-soluble, it prefers the water phase and does not exhaust onto the fiber. This is especially noted where long liquor ratios are used. Even in the case of a carrier so widely used as ortho-phenyl phenol, both concentration on fabric weight and concentration on bath volume must be balanced where liquor ratio is increased.

Although water solubility of such carrier materials as trichlorobenzene, naphthalene, and biphenyl is low, their solubility need not exceed .1%. Solubility of a number of disperse dyes is in the .005 to .01% range. Yet these dyes show a rapid exhaustion achieving 50-70% pickup in 10 minutes at 90°C on cellulose acetate despite their low solubility.

Of further practical importance is the characterization of carriers as those of variable strike, exhaustion levels, outward diffusion (washfastness) and leveling action. This in-

formation must necessarily follow from the consideration of carriers as colorless "dyes" with substantivity, diffusion rates, strike and desorption behavior. The need for such characterization is one of the practical recommendations of this paper.

THEORIES INVOLVING CHANGES IN INTERNAL STRUCTURE OF FIBER———The concept that the carrier changes the internal compact structure of the fiber to one which is more open appears as the most logical choice for mechanism of carrier action. Whether the manner in which this is achieved is by swelling, lubricity of the fiber molecules, or substituting the freer fiber-carrier bond for the firm fiber-fiber bond is not as important as the fact that carrier action is within the fiber rather than in the dyebath. Once attention has been focused by the dyer on activity within the fiber, many of the puzzling phenomena and mysteries of carrier action will find explanation to the dyer who feels vulnerable because of lack of priciples which he can use for control.

The section on "Mechanism of Dyeing of Disperse Dyes" was introduced as background to this paper because an understanding of mechanism of carrier action must be based on the modern theories of dyeing phenomena and fiber structure outlined. The modern concepts of dyeing based on such points as diffusion gradient, electrical forces binding fiber molecules, and fiber to dye, heats of dyeing, etc, are becoming part of the thinking of the modern dyer.

The phenomena of dyeing affinity is based on electrical forces between dye molecule and the fiber. The rate of dyeing is essentially dependent on the rate of diffusion within the fiber —the rate-determining step. Obviously, if sites on the periphery of the fiber are saturated with dye molecules and no inward diffusion occurs, then no further dye is absorbed—akin to a traffic jam. For inward diffusion to occur, the dye molecule must transfer from area of higher concentration to that of lower concentration. Both dyes and fibers vary in the amount of energy required (heats of affinity) for dye bond to be formed or loosened.

The problem in terms of modern theory reduces to the basic question of how to get diffusion of dye through closely packed, high polymeric fibers.

Theory of Loosening the Fiber Structure. The theory of loosening the fiber structure fits both dyeing mechanism and carrier action. The hydrophobic fibers are long-chain molecules of high molecular weight containing areas along their chain which may be crystalline and amorphous. Dyeing takes place in the amorphous regions. The fiber molecules are which may be hydrogen bonding or Van der Waals forces. These electrical forces give the bundle of fiber molecules a solid gel structure. Through this solid gel structure, penetration by dye liquors is difficult because of lack of openings. Under the influence of heat, there is more rapid vibration of the segments of the molecules. The thermal agitation increases number of "holes" which form as fiber-fiber bonds are split.

When carrier is absorbed by fiber, it forms a fiber-carrier bond. It will be noted that carriers are both substantive to the fiber and also are materials of aromatic nature, chlorinated compounds, phosphates, esters, ketones, amines and phenols. These structures possess dipole moments, H-bonding, and Van der Waals forces. As the fiber molecules vibrate, the bonds separate and the carrier fiber bonds substitute. These are looser bonds and break more easily under influence of increased dyeing temperatures. The number of holes per unit time increases. The net result of this greater activity is greater accessibility and the desired increase in diffusion rate of the dye.

The experimental observations support this mechanism:

a) Carrier materials are absorbed by the fiber in appreciable amount. The quantity is enough to account for potential number of fiber-to-fiber bonds with substitution of carrier-fiber bonds.
b) Where "carrier" is not absorbed as in case of tripropyl phosphate on Dacron, no accelerant action is obtained.
c) Carriers are tenaciously held by internal structure, resisting vigorous scouring. They obey laws of substantivity similar to dyes. The net effect is one of combination by electrical forces to the fiber.
d) The substitution of fiber carrier bonds for fiber-fiber bonds gives a loosening in structure responsible for such phenomena as shrinkage (Experiment VII). Swelling need not be a universal property of carriers as shown by behavior of the trichlorobenzene in specific gravity experiments and solvent-dyeing experiments.
e) Desorption experiments show that carriers act within fiber, further focusing attention on fiber activity rather than dyebath activity.
f) The penetration of small molecules in water solution is increased by carrier treatment for the hydrophobic closely compact polyester fiber. This is shown in the nitrosation experiments. This phenomena was not shown by the cellulose triacetate.
g) The pretreatment experiments indicate that the carrier must be present for accelerant action. It has a dynamic function in the dyeing process which is to convert the fiber-fiber bonds to the fiber-carrier bonds. The alternative function of carrier to give a pushing apart of the fiber molecules as might be expected of swelling is not necessary where water-insoluble carriers are being used. Trichlorobenzene is a chemical with poor solvation properties which should not be expected to behave as a swelling agent. Yet its carrier effectiveness is high.
h) The practical aspect of carrier action is that 1) carrier acts within fiber; 2) if carrier is not absorbed, there is no carrier action, and 3) that factors that reduce carrier absorbance result in lower dyeing rates.

PRACTICAL APPLICATIONS OF PROPOSED CARRIER MECHANISM AND PRINCIPLES

In the introduction, a series of sixteen questions were listed. These represent many of the most frequently asked questions on carrier action as compiled by the investigators from cross section of practical dyers, fiber manufacturers, dye manufacturers, and suppliers of accelerants. The mechanism of carrier action as proposed has been successful in giving a sound and logical basis for the answers to these questions. Most of these questions find explanation or answer in this paper. The following explanations are representative of the use of principles underlying carrier action in attacking these practical questions:

1) *What is the optimum quantity of carrier useful for a specific dye for a specific depth of shade?*

More absorbed carrier is required for dye of slow diffusion rate within fiber. More absorbed carrier is needed in heavy depths to increase diffusion rate of dye away from outer ring. With carrier of known pickup by the fiber, carrier concentration can be adapted to the need.

2) *What effect does change in liquor ratio have on effectiveness of carrier action with constant percentage on fabric weight?*

Carrier absorption from bath determines carrier action. At high liquor ratios bath competes with fabric for carrier and like exhaustion data for disperse dyes, quantity of carrier absorbed will be less. This results in weaker carrier action. With carrier of lower water solubility, effect of liquor ratio will be less pronounced.

8) *Why does carrier change its effectiveness when used upon cellulose triacetate or polyester fibers that have been heat treated?*

Heat treatment causes the hydrophobic fiber to become more compact in structure, increasing the number of fiber-fiber bonds. There may also be an increase in the crystalline areas, which reduces dyeable areas. Higher degree of carrier action with increased rate and quantity of carrier absorption is necessary.

14) *Is there any basic reason as to choice of carrier and function of carriers in minimizing staining of disperse dyes for cotton and wool?*

Staining is proportional to the quantity of disperse dye residual in the dyebath. The greater the carrier action on the hydrophobic fiber, the less the staining on wool or cotton. The staining of disperse dyes is also dependent on pH and on surfactant present, as well as the specific dye. The emulsification agent used in formulating the carrier, and the pH required for absorption of carrier will be factors which can contribute to variable staining between carrier.

16) *What is basic reason for control of pH in use of carriers based on phenols?*

Phenols are not absorbed by the fibers as sodium salts. They must be present as free phenols. An acid pH is necessary to prevent formation of sodium salts, thereby permitting maximum absorption of the phenyl phenols by the fiber.

CONCLUSIONS

1) Basic data derived from a series of key experiments supports the following mechanism by which carriers act in accelerating the dyeing rate of disperse dyes on hydrophobic fibers. The mechanism is one involving action within the fiber rather than in the dyebath. The action of absorbed accelerant is to loosen the internal structure of the hydrophobic fiber, permitting more opportunity for diffusion of dye into the fiber. Dye diffuses through "holes" formed as fiber interchain bonds dissociate under thermal agitation. The carrier is absorbed and acts by partially replacing interchain bonds with more easily disrupted fiber - accelerant bonds. With increased mobility, the number of openings will increase under same thermal energy resulting in more permeable fiber and greater dye diffusion.

2) The principles established and the proposed mechanism have been applied to a number of problems of carrier behavior confronting the practical dyer.

3) Technique and data are reported on solubility of dye in carrier. Dye solubility and carrier action are not interdependent.

4) Techniques and data are given for quantitative absorption of carrier by fibers. The principle is established that carrier action does not take place unless carrier is absorbed. Increased absorption of carrier results in greater dyeing acceleration.

5) Useful data is presented showing effect of type and quantity of surfactants in decreasing accelerant action of carriers.

6) Techniques have been developed and data obtained showing that water imbibition of fibers containing absorbed carrier is essentially the same as that of fibers without carrier.

7) From results of specific gravity determination and solvent dyeing from carrier films, it can be shown that swelling properties are not necessary for an effective carrier.

8) The effect of carrier on desorption of dyes, the physical effects of carrier on fiber, and the effect of carrier pretreatment on subsequent dyeing rate have been related to the absorption of carrier within the fiber.

TRADEMARKS

The following product names, which have been used in this paper, are registered trademarks: Dacron (Du Pont); Kodel (Eastman); Terylene (Imperial Chemical Industries); Arnel (Celanese); Verel (Eastman); Darvan (B F Goodrich); Latyl (Du Pont); Interchem (Interchemical Corp); Cellosolve (Union Carbide); Launder-Ometer (Atlas Electric Devices Co); Igepon (GAF); Dowicide (Dow); Tamol (Rohm and Haas).

BIBLIOGRAPHY

(1) Waters, E, *J Soc Dyers Col 66:* 609-614 (1950)
(2) Imperial Chemical Industries, Ltd, London, England, "The Dyeing of Terylene Polyester Fiber", 1954.
(3) Vickerstaff, T, *Hexagon Digest* 20-7, ICI Bulletin, 1954.
(4) Zimmerman, C L, Mecco, J M, and Carlino, A J, *Am Dyestuff Reptr 44:* 296-301 (1955).
(5) Landerl, H P, *DuPont Tech Bull 12:* 81-90 1956)
(6) Fern, A S, and Hadfield, H R, *J Soc Dyers Col 71:* 840-855 (1955)
(7) Carmichael, D G, *Textile Age 15:* 32-35 (1951)
(8) Fortess, F, *Am Dyestuff Reptr 44:* 524-536 (1955)
(9) Rawicz, F M, "Some Aspects of the Mechanism of Dyeing Polyethylene Terephthalate Fibers with Nonionic (Disperse) Dyes in the Presence of Dyeing Assistants", Unpublished Thesis—North Carolina State College
(10) Millson, H E, *Am Dyestuff Reptr 44:* 417-436 (1955)
(11) Greer, J E, private communication
(12) Schuler, J J, *Textile Research J 27:* 352-358 (1957)
(13) Fortess, F, and Salvin V S, *ibid 23:* 1009-1021 (1958)
(14) Glenz, O, Beckmann, W, and Wunder, W, *J Soc Dyers Col 75:* 141-147, (1959)
(15) Salvin, V S, *Am Dyestuff Reptr 48:* 35-47 (1959)
(16) Bird, C L, *J Soc Dyers Col 74:* 688-693, (1958)
(17) Schuler, J J, and Remington, W R, *Trans Faraday Soc 16:* 201-209 (1954)
(18) Fortess, F, *Textile Research J 29:* 23-35 (1949)
(19) Ratcliffe, J D, *Man-Made Textiles 34:* 61-62 (1957)

Correction in *Technical Manual*

On page 588 of the 1959 Technical Manual of the American Association of Textile Chemists and Colorists, Benjamin S Bellemere was listed as president of Belle Chemical Co, Inc. This should be corrected to: Owner, Bellemere & Company.

COLOUR INDEX
Additions and Amendments
Number 5*

Copies of these lists printed on one side of the paper only are available. For further details apply to AATCC National Headquarters, P O Box 28, Lowell, Mass.

* The lists appeared in the *American Dyestuff Reporter* as follows: No. 1, November 3, 1958; No. 2, January 26, 1959; No. 3, May 4, 1959; No. 4, August 10, 1959.

VOLUME 1
Additional *Colour Index* Designations and Numbers

Page		
1052	CI 19110 Monoazo	CI Acid Yellow 122
		Acid Yellow RR ..... Adel
	Monoazo, 1:2 metal complex	CI Acid Yellow 123
		HUE Yellow ARTIFICIAL LIGHT: unchanged Vondalan Yellow GL ..... Vond
		CI Acid Yellow 124
		HUE Bright Reddish Yellow Lanamid Yellow GA ..... NAC
1090	Monoazo, 1:2 metal complex	CI Acid Orange 90
		HUE Reddish Orange ARTIFICIAL LIGHT: unchanged Vondalan Orange RL ..... Vond
	Monoazo, 1:2 metal complex	CI Acid Orange 91
		HUE Orange ARTIFICIAL LIGHT: unchanged Vondalan Yellow 2RL ..... Vond
1189	Monoazo, 1:2 metal complex	CI Acid Red 244
		HUE Red ARTIFICIAL LIGHT: unchanged Vondalan Red GL ..... Vond
	Monoazo, 1:2 metal complex	CI Acid Red 245
		HUE Yellowish Red ARTIFICIAL LIGHT: unchanged Vondalan Orange 3RL ..... Vond

Page		
1227	Monoazo, 1:2 metal complex	CI Acid Violet 82
		HUE Reddish Violet ARTIFICIAL LIGHT: slightly redder Vondalan Bordeaux 2RL ..... Vond
	Monoazo, 1:2 metal complex	CI Acid Violet 83
		HUE Bluish Violet ARTIFICIAL LIGHT: slightly redder Vondalan Corinth BL ..... Vond
1305		CI Acid Blue 176
Similar in usage and properties to, but not identical with, CI Acid Blue 69		HUE Blue Alizarine Fast Blue FP ..... LBH
1404	Monoazo, 1:2 metal complex	CI Acid Black 99
		HUE Bluish Grey ARTIFICIAL LIGHT: slightly redder Vondalan Grey BL ..... Vond
	Monoazo, 1:2 metal complex	CI Acid Black 100
		HUE Bluish Grey ARTIFICIAL LIGHT: redder Vondalan Grey 3RL ..... Vond
1729		CI Disperse Blue 41
		HUE Bright Blue Nacelan Blue KLT ..... NAC

Amendments

Page	*Colour Index Designation*		
1154	CI Acid Red 141	*add*	Fast Red V ..... Adel
			Neutrapel Fast Red 3BS ..... NAC

HUE Yellowish Red
ARTIFICIAL LIGHT: unchanged
Vondalan Orange 3RL ..... Vond

CI Disperse Blue 41

HUE Bright Blue
Nacelan Blue KLT ..... NAC

Amendments

Page	Colour Index Designation		
1003	CI Acid Yellow 1	*add*	Ext D&C Yellow No. 7 ..... CCC, ICI, KO, NAC, W, WJ
		add	Ext D&C Yellow No. 8
			Note—Ext D&C Yellows Nos. 7 and 8 are the sodium and potassium salts respectively
1008	CI Acid Yellow 11	*add*	Flavazine L ..... Adel
1011	CI Acid Yellow 18	*add*	Acid Yellow G ..... Adel
1014	CI Acid Yellow 25	*add*	Pernilan Yellow R ..... Vond
1015	CI Acid Yellow 27	*add*	Java Yellow S ..... Vond
1016	CI Acid Yellow 29	*add*	Java Light Yellow 2GL ..... Vond
1019	CI Acid Yellow 36	*add*	Eniacid Metanil Yellow GN ..... Enia
		add	Java Metanil Yellow G ..... Vond
1027	CI Acid Yellow 54	*add*	Chrome Intra Yellow EL ..... Vond
1056	CI Acid Orange 7	*add*	Acid Orange YP ..... NAC
1062	CI Acid Orange 19	*add*	Pernilan Red GG ..... Vond
	CI Acid Orange 20	*add*	Eniacid Orange I ..... Enia
		add	Orange I Extra Conc A Export ..... Fran
1069	CI Acid Orange 36	*add*	Pernilan Orange G ..... Vond
1081	CI Acid Orange 64	*delete*	Neutranyl Fast Golden Brown ..... NAC
		add	Lanamid Golden Brown ..... NAC
1084	CI Acid Orange 74	*add*	Chrome Intra Orange G ..... Vond
1088	CI Acid Orange 85	*add*	Lanamid Yellow 2RL ..... NAC
1089	CI Acid Orange 88	*add*	Lanamid Orange RL ..... NAC
1091	CI Acid Red 1	*add*	Eniacid Light Red 3G ..... Enia
1094	CI Acid Red 7	*add*	Azogrenadine S ..... Adel
	CI Acid Red 8	*add*	Scarlet A ..... Adel
1096	CI Acid Red 12	*add*	Chrome Blue 3B ..... Adel
1097	CI Acid Red 14	*add*	Eniacid Brilliant Rubine 3B ..... Enia
		add	Java Chromotrope Blue FB ..... Vond
1098	CI Acid Red 17	*add*	Bordeaux B Extra Conc A Export ..... Fran
1099	CI Acid Red 18	*add*	Java Scarlet 3R ..... Vond
		add	Ponceau 3R ..... Adel
		add	Pontacyl Scarlet RR ..... DuP
1101	CI Acid Red 23	*add*	Azogrenadine L ..... Adel
1103	CI Acid Red 27	*add*	Wool Bordeaux 6RK ..... Adel
1106	CI Acid Red 34	*for*	Light Fast Rubinol BL ..... Acna (*see A & A* p 4556)
		read	Light Fast Rubine BL ..... Acna (correct as originally printed)
1107	CI Acid Red 35	*add*	Pernilan Red 3B ..... Vond
		add	Wool Red 3B ..... Adel
1111	CI Acid Red 44	*add*	Ponceau 6R ..... Adel
1130	CI Acid Red 88	*add*	Fast Red A ..... Adel
1134	CI Acid Red 97	*add*	Java Brilliant Fast Red G ..... Vond
1142	CI Acid Red 115	*delete*	Eniacromo Bordeaux R ..... Enia
1154	CI Acid Red 141	*add*	Fast Red V ..... Adel
1169	CI Acid Red 182	*delete*	Neutranyl Fast Red 3BS ..... NAC
		add	Lanamid Red 3BS ..... NAC
1191	CI Acid Violet 1	*add*	Wool Violet RL ..... Adel
1192	CI Acid Violet 3	*add*	Wool Violet 4BS ..... Adel
1197	CI Acid Violet 13	*add*	Wool Violet 2R ..... Adel
1201	CI Acid Violet 21	*add*	Pontacyl Violet 4BL ..... DuP
1227	CI Acid Violet 78	*add*	Lanamid Violet DL ..... NAC
1230	CI Acid Blue 3	*add*	New Patent Blue Extra Pure A ..... Fran
1240	CI Acid Blue 25	*add*	Alizarine Blue A ..... Vond
1247	CI Acid Blue 42	*add*	Peri Wool Blue B ..... Adel
1260	CI Acid Blue 69		
	in the heading	*add*	CI 63610
		delete	Alizarine Fast Blue FP ..... LBH
1263	CI Acid Blue 75	*delete*	Pontacyl Violet 4BL ..... DuP
1280	CI Acid Blue 113	*add*	Eniacid Cloth Blue 5R ..... Enia
1283	CI Acid Blue 120	*add*	Eniacid Cloth Blue GR ..... Enia
		delete	The following brand is similar
			Pontacyl Fast Blue GB ..... DuP
1287	CI Acid Blue 129	*add*	Brilliant Alizarine Sky Blue BS ..... NAC
1299	CI Acid Blue 158-158A		
	under		
	CI Acid Blue 158—		
	CI 14880	*add*	Chromacyl Blue GG ..... DuP
		add	Palatine Fast Blue GGN ..... Adel
	under		
	CI Acid Blue 158 or 158A	*delete*	Chromacyl Blue GG ..... DuP (*see A & A* List No. 1)
1312	CI Acid Green 12	*add*	Palatine Fast Green BLN ..... Adel
1318	CI Acid Green 25	*add*	Alizarine Light Green GNS ..... S
1335	CI Acid Brown 17	*add*	Naphthanol Brown R ..... Adel
1340	CI Acid Brown 29	*delete*	Neutranyl Fast Bown RD ..... NAC
		add	Lanamid Brown RD ..... NAC
1355	CI Acid Brown 88	*add*	Leather Brown G ..... Adel
1375	CI Acid Black 1	*add*	Blue Black 12B ..... Adel
1376	CI Acid Black 2	*add*	Enia Nigrosine BSA ..... Enia
		add	Nigrosine Crystals SB Water Soluble ..... Acna
		add	Water Nigrosine SB Crystals ..... Acna
		add	Water Nigrosine WL, WLA ..... Adel
1383	CI Acid Black 21	*add*	Java Milling Black G ..... Vond
1384	CI Acid Black 24	*add*	Sulphone Black BB ..... Adel
1386	CI Acid Black 29	*add*	Neutral Black BSS ..... NAC
1393	CI Acid Black 48	*add*	Alizarine Grey GGLW ..... Adel
1399	CI Acid Black 63		
	in the heading	*add*	Monoazo (metallized) similar to CI 12195

Page	Colour Index Designation		
1452	CI Mordant Red 3	*add*	Alizarine S Extra Conc A Export Fran
		add	Alizarine S Extra Pure A Fran
1453	CI Mordant Red 5	*add*	Chrome Bordeaux A Adel
		add	Eniacromo Garnet A Enia
1460	CI Mordant Red 19	*add*	Chrome Red 3G Adel
1481	CI Mordant Violet 2	*add*	Eniacromo Bordeaux R Enia
1504	CI Mordant Blue 3	*add*	Chrome Blue 3R Adel
1506	CI Mordant Blue 7	*add*	Alizarol Cyanone BLL NAC
1533	CI Mordant Green 9		
		delete	Pontachrome Green G DuP
1545	CI Mordant Green 36	*add*	Pontachrome Green G DuP
1551	CI Mordant Brown 1	*add*	Alizarine Brown EB Adel
		add	Chromate Brown EBNL DuP
1557	CI Mordant Brown 15		
		add	Chrome Brown KE Adel
		add	Java Chrome Brown KE Vond
1585	CI Mordant Black 1	*add*	Eniacromo Black A Enia
1588	CI Mordant Black 7	*add*	Chrome Black PBB Adel
1590	CI Mordant Black 11	*add*	Eniacromo Black PA Enia
1593	CI Mordant Black 17	*add*	Chrome Blue Black BSS Adel
		add	Superchrome Blue ZFAM NAC
1619	CI Basic Yellow 2	*add*	Auramine Adel
		add	Auramine O Extra Conc A Export Fran
1623	CI Basic Orange 2	*add*	Chrysoidine G Adel
1628	CI Basic Orange 21	*add*	Sevron Orange G DuP
1632	CI Basic Red 13	*add*	Nabor Brilliant Pink 2B NAC
1633	CI Basic Violet 1	*add*	Eniamethyl Violet 2B, 3B Enia
		add	Violet RA Export Fran
1639	CI Basic Blue 4	*add*	Sevron Blue 5G DuP
1648	CI Basic Green 4	*add*	Malachite Green Adel
1668	CI Disperse Yellow 23		
		delete	Acetamine Fast Yellow 4RL DuP
1682	CI Disperse Orange 11		
		add	Celanthrene Orange Extra DuP
1685	CI Disperse Orange 17		
		add	Nacelan Brilliant Orange 3R NAC
1687	CI Disperse Red 1	*add*	Eniacyl Scarlet B Enia
1696	CI Disperse Red 19	*add*	Eniacyl Scarlet B2G Enia
1706	CI Disperse Violet 4		
		transfer	Celanthrene Violet CB DuP to listing under "The following brands are similar"
1735	CI Disperse Black 1	*add*	Latyl Diazo Black B DuP
1738	CI Disperse Black 9	*add*	Diazacyl Black GM Enia
1775	CI Food Yellow 1	*add*	Naphthol Yellow S Extra Conc A Export Fran
		delete	FD&C Yellow No. 1 CCC, ICI, KO, NAC, W, WJ
		delete	FD&C Yellow No. 2

Page	Colour Index Designation		
1775	CI Food Yellow 1		
	under Included in 'permitted' lists for USA (FD&C Yellows Nos. 1 and 2)	*read*	permitted in USA for external drug drug and cosmetic use only (Ext D&C Yellows Nos. 7 and 8)
	CI Food Yellow 2	*delete*	Acid Yellow 2SA Export Fran
	CI Food Yellow 3	*add*	Eniacid Sunset Yellow Enia
		add	Sun Yellow Extra Pure A Fran
1776	CI Food Yellow 4	*add*	Tartrazine Extra Pure A Fran
1777	CI Food Yellow 8	*add*	Chrysoine Extra Pure A Fran
1778	CI Food Yellow 10	*delete*	Organol Yellow ANA Export Fran
		delete	FD&C Yellow No 3 AAP, CCC, DC, KO, NAC, WJ
	under Included in 'permitted' lists for USA (FD&C Yellow No. 3)	*read*	permitted in USA for external drug drug and cosmetic use only (Ext D&C Yellow No. 9)
1778	CI Food Yellow 11	*delete*	Organol Yellow TNA Export Fran
		delete	FD&C Yellow No. 4 AAP, CCC, DC, KO, NAC, WJ
	under Included in 'permitted' lists for USA (FD&C Yellow No. 4)	*read*	permitted in USA for external drug drug and cosmetic use only (Ext D&C Yellow No. 10)
1779	CI Food Yellow 13	*add*	Quinoline Yellow Extra Pure A Fran
1781	CI Food Orange 1	*delete*	Croceine Orange RA Export Fran
1783	CI Food Red 2	*add*	HUE Yellowish Red
		add	Acid Scarlet JN Extra Pure A Fran
1783	CI Food Red 3	*add*	Nacarat Extra Pure A Fran
1784	CI Food Red 4	*delete*	Fast Red Extra Conc A Fran
1785	CI Food Red 7	*delete*	New Coccine Extra Conc A Fran
		add	New Coccine Extra Conc A Export Fran
		add	New Coccine Extra Pure A Fran
	CI Food Red 9	*delete*	Bordeaux S Extra Conc A Fran
		add	Bordeaux S Extra Conc A Export Fran
		add	Bordeaux S Extra Pure A Fran
1787	CI Food Red 14	*delete*	Erythrosine Extra Conc A Fran
		add	Erythrosine Extra Conc A Export Fran
		add	Erythrosine Extra Pure A Fran
1789	CI Food Violet 1	*add*	Milling Violet S4BA Export Fran
1791	CI Food Blue 1	*add*	Indigotine Extra Pure A Fran
	CI Food Blue 3	*add*	Brilliant Acid Blue VS Extra Conc A Export Fran
1793	CI Food Green 1	*delete*	Sulpho Green 2BA Export Fran
	CI Food Green 2	*delete*	Acid Green J Extra Conc A Fran
1797	CI Food Black 1	*add*	Brilliant Acid Black BN Extra Pure A Fran
		add	Brilliant Acid Black BNA Export Fran

Appendix II
Dyes permitted for use in USA

Page			
2367	CI 53150 Sulfur		CI Sulfur Yellow 12
	CI Solubilized Sulfur		CI Solubilized Sulfur Yellow 12

delete	FD&C Yellow No. 1	CCC, ICI, KO, NAC, W, WJ	
delete	FD&C Yellow No. 2		

1797	CI Food Black 1	*add*	Brilliant Acid Black BN Extra Pure A ..... Fran
		add	Brilliant Acid Black BNA Export Fran

Appendix II
Dyes permitted for use in USA

Page					
1800					
	delete	FD&C Yellow No. 1	10316	Food Yellow 1	Acid Yellow 1
	delete	FD&C Yellow No. 2			
	delete	FD&C Yellow No. 3	11380	Food Yellow 10	Solvent Yellow 5
	delete	FD&C Yellow No. 4	11390	Food Yellow 11	Solvent Yellow 6
1802					
	add	Ext D&C Yellow No. 7	10316 (Sodium salt)		Acid Yellow 1
	add	Ext D&C Yellow No. 8	10316 (Potassium salt)		Acid Yellow 1
	add	Ext D&C Yellow No. 9	11380		Solvent Yellow 5
	add	Ext D&C Yellow No. 10	11390		Solvent Yellow 6

VOLUME 2

Page	Additional *Colour Index* Designations and Numbers	
2074	CI 22190 Disazo	CI Direct Orange 101
		HUE Bright Orange Benzo Orange CG ..... FBy Milling Orange G ..... NAC
2168	Disazo (metallized)	CI Direct Violet 89
		HUE Reddish Violet Diazol Light Bordeaux 2BL ..... Fran
2142	CI 35785 Polyazo	CI Direct Red 194
		Solex Bordeaux ..... Adel
2142		CI Direct Red 195
		HUE Dull Yellowish Red Solantine Brown 4RLVF ..... NAC
2236	CI 51305 Oxazine	CI Direct Blue 190
		HUE Bright Blue Diazol Light Pure Blue FFB ... Fran
		CI Direct Blue 191
		HUE Bright Blue Solantine Blue 8GLVF ..... NAC
2324	CI 13220 Monoazo	CI Direct Brown 191
		HUE Reddish Brown Padding Brown N ..... Fran
2367	CI 53150 Sulfur	CI Sulfur Yellow 12 CI Solubilized Sulfur Yellow 12
		HUE Yellow CI Sulfur Yellow 12 Sulfanol Yellow JCL ..... Fran CI Solubilized Sulfur Yellow 12 Applied by method 4 Heliasol Yellow JCL ..... Fran
2384		CI Sulfur Blue 16
		HUE Reddish Blue Applied by method 1 Sulfur Direct Blue N ..... NAC
2477	Anthraquinone	CI Vat Red 50
		HUE Bluish Pink Solanthrene Red BJ ..... Fran
2563	CI 73660 Indigoid	CI Vat Black 35
		HUE Greenish Grey → Black Solanthrene Grey 3BL ..... Fran Solanthrene Printing Black BJL Fran
		CI Vat Black 36
		HUE Black Carbanthrene Printing Black BBD ..... NAC
2612		CI Azoic Diazo Component 110
		Diazotype Blue 3RDZ Salt ..... NAC
2612		CI Azoic Diazo Component 111
		Diazotype Blue 3RD Salt ..... NAC
2678		CI Azoic Black 10
		HUE Black Eniagem Black TG ..... Enia
2724	CI 77201 Inorganic	CI Pigment Orange 23
		HUE Yellowish Orange → Reddish Orange Mercadium Orange ..... IMP

Page		
2762	CI 12370 Monoazo	CI Pigment Red 112
		Segnale Light Red FGR ..... Acna
	CI 77201 Inorganic	CI Pigment Red 113
		HUE Yellowish → Bordeaux Mercadium Reds and Maroons ..... IMP
2809	CI 77230 Inorganic	CI Pigment White 28
	Used as a white filler in paper to replace TiO_2 when fluorescent brightening agents are used	Calcium Silicate Baysical K ..... FBy
2832		CI Solvent Yellow 53
		HUE Bright Greenish Yellow Plasto Yellow MGSM ..... NAC
2865		CI Solvent Red 74
		HUE Bright Bluish Red Iosol Red 4B ..... NAC
		CI Solvent Red 75
		HUE Bright Bluish Red Spirit Soluble Fast Red 3B ..... NAC
		CI Solvent Red 76
		HUE Bright Yellowish Red Spirit Soluble Fast Red 3R ..... NAC
2883		CI Solvent Blue 39
		HUE Bright Reddish Blue Spirit Soluble Fast Blue RBF ..... NAC
2904		CI Solvent Black 20
		HUE Bluish Black Spirit Soluble Fast Black NJ ..... NAC

Amendments

Page	Colour Index Designation		
2003	CI Direct Yellow 1	*add*	Diazol Chrysamine J ..... Fran
2004	CI Direct Yellow 4	for	Brilliant Yellow ..... AD
		read	Brilliant Yellow ..... Adel
2005	CI Direct Yellow 6	*delete*	Diazol Fast Yellow AL ..... Fran
2006	CI Direct Yellow 8	*add*	Direct Yellow 6G ..... Vond
2008	CI Direct Yellow 11	*add*	Direct Yellow RN ..... Vond
2009	CI Direct Yellow 12	*add*	Chrysophenine G ..... Adel
2012	CI Direct Yellow 22	*delete*	Diazol Yellow 3J ..... Fran (*see A & A* p 4563)
2013	CI Direct Yellow 24		Direct Gold Yellow 3R ..... Fran
2014	CI Direct Yellow 27	*add*	Solex Canary Yellow 5G ..... Adel
2015	CI Direct Yellow 28	*add*	Tetramine Fast Yellow DD ..... NCF
2016	CI Direct Yellow 29	*add*	Cuprodiazol Light Yellow JR ..... Fran
		add	Diazol Light Yellow JMA ..... Fran
		add	Enianil Fast Yellow B ..... Enia
		add	Enianil Light Yellow RT ..... Enia
		add	Tetramine Fast Yellow WB extra NCF
2021	CI Direct Yellow 42	*delete*	Diazol Light Yellow RLN ..... Fran
2022	CI Direct Yellow 44	*add*	Diazol Light Yellow 2JS ..... Fran
		add	Triantine Fast Yellow FGL ..... Vond
2024	CI Direct Yellow 50	*add*	Pontamine Fast Yellow RLP ..... DuP
		add	Tetramine Fast Yellow R extra ..... NCF
2025	CI Direct Yellow 51	*add*	Diazol Light Yellow RS ..... Fran
2033		*delete*	CI Direct Yellow 71
2037	CI Direct Orange 1	*add*	Cotton Fast Orange G ..... Adel
2039	CI Direct Orange 7	*delete*	Diazol Brilliant Orange J ..... Fran
2040	CI Direct Orange 8	*add*	Enianil Orange 2RR ..... Enia
2041	CI Direct Orange 10	*delete*	Diazol Brilliant Orange R ..... Fran
		add	Tolidine Orange TR ..... Adel
2042		*delete*	CI Direct Orange 14
2043	CI Direct Orange 15	*delete*	Chrome Leather Orange J3R ..... Fran
		delete	Diazol Orange J2R ..... Fran
2044	CI Direct Orange 18	*delete*	Diazol Orange PBR ..... Fran
2045		*delete*	CI Direct Orange 20
2047	CI Direct Orange 26	*add*	Enianil Brilliant Orange S ..... Enia
2048	CI Direct Orange 29	*transfer*	Pontamine Fast Orange WS ..... DuP to listing under "The following brands are similar"
2050	CI Direct Orange 34	*add*	Diazol Light Orange 5J ..... Fran
		add	Diazol Light Orange 7JL ..... Fran
		add	Triantine Fast Orange GEL ..... Vond
	CI Direct Orange 36		Diazol Light Orange 5J ..... Fran
2052	CI Direct Orange 39	*add*	Tetramine Fast Orange GGD ..... NCF
2055	CI Direct Orange 49	*add*	Diazol Light Orange JMA ..... Fran
		add	Tetramine Fast Orange R extra ..... NCF
2059	CI Direct Orange 60	*delete*	Calcodur Orange E3GL CCC
2062	CI Direct Orange 69	*delete*	Diazol Light Orange R ..... Fran

Page	Colour Index Designation		
2063	CI Direct Orange 73	*add*	Diazamine Orange N ..... Fran
2064	CI Direct Orange 74	*add*	Diazol Light Orange RS ..... Fran
2065	CI Direct Orange 75	*add*	Diazol Light Orange 3RS ..... Fran
2066	CI Direct Orange 76	*add*	Diazol Light Orange 2RS ..... Fran
2067	CI Direct Orange 77	*add*	Diazol Light Orange 3GS ..... Fran
2068	CI Direct Orange 78	*add*	Diazol Light Orange 2GS ..... Fran
2069	CI Direct Orange 79	*add*	Diazol Light Orange 4GS ..... Fran
2070	CI Direct Orange 80	*add*	Diazol Light Orange 5GS ..... Fran
2071	CI Direct Orange 81	*add*	Diazol Light Orange 6GS ..... Fran
2072	CI Direct Orange 82	*add*	Diazol Light Orange 7GS ..... Fran
2073	CI Direct Orange 83	*add*	Diazol Light Orange 8GS ..... Fran
2074	CI Direct Orange 84	*add*	Diazol Light Orange 9GS ..... Fran
2075	CI Direct Orange 85	*add*	Diazol Light Orange 10GS ..... Fran
2076	CI Direct Orange 86	*add*	Diazol Light Orange 11GS ..... Fran
2077	CI Direct Orange 87	*add*	Diazol Light Orange 12GS ..... Fran
2078	CI Direct Orange 88	*add*	Diazol Light Orange 13GS ..... Fran
2079	CI Direct Orange 89	*add*	Diazol Light Orange 14GS ..... Fran
2080	CI Direct Orange 90	*add*	Diazol Light Orange 15GS ..... Fran
2081	CI Direct Orange 91	*add*	Diazol Light Orange 16GS ..... Fran
2082	CI Direct Orange 92	*add*	Diazol Light Orange 17GS ..... Fran
2083	CI Direct Orange 93	*add*	Diazol Light Orange 18GS ..... Fran
2084	CI Direct Orange 94	*add*	Diazol Light Orange 19GS ..... Fran
2085	CI Direct Orange 95	*add*	Diazol Light Orange 20GS ..... Fran
2086	CI Direct Orange 96	*add*	Diazol Light Orange 21GS ..... Fran
2087	CI Direct Orange 97	*add*	Diazol Light Orange 22GS ..... Fran
2088	CI Direct Orange 98	*add*	Diazol Light Orange 23GS ..... Fran
2089	CI Direct Orange 99	*add*	Diazol Light Orange 24GS ..... Fran
2090	CI Direct Orange 100	*add*	Diazol Light Orange 25GS ..... Fran
2091	CI Direct Orange 101	*add*	Diazol Light Orange 26GS ..... Fran
2092	CI Direct Orange 102	*add*	Diazol Light Orange 27GS ..... Fran
2093	CI Direct Orange 103	*add*	Diazol Light Orange 28GS ..... Fran
2094	CI Direct Orange 104	*add*	Diazol Light Orange 29GS ..... Fran
2095	CI Direct Orange 105	*add*	Diazol Light Orange 30GS ..... Fran
2096	CI Direct Orange 106	*add*	Diazol Light Orange 31GS ..... Fran
2097	CI Direct Orange 107	*add*	Diazol Light Orange 32GS ..... Fran
2098	CI Direct Orange 108	*add*	Diazol Light Orange 33GS ..... Fran
2099	CI Direct Orange 109	*add*	Diazol Light Orange 34GS ..... Fran
2100	CI Direct Orange 110	*add*	Diazol Light Orange 35GS ..... Fran
2101	CI Direct Orange 111	*add*	Diazol Light Orange 36GS ..... Fran
2102	CI Direct Orange 112	*add*	Diazol Light Orange 37GS ..... Fran
2103	CI Direct Orange 113	*add*	Diazol Light Orange 38GS ..... Fran
2104	CI Direct Orange 114	*add*	Diazol Light Orange 39GS ..... Fran
2105	CI Direct Orange 115	*add*	Diazol Light Orange 40GS ..... Fran
2106	CI Direct Orange 116	*add*	Diazol Light Orange 41GS ..... Fran
2107	CI Direct Orange 117	*add*	Diazol Light Orange 42GS ..... Fran
2108	CI Direct Orange 118	*add*	Diazol Light Orange 43GS ..... Fran
2109	CI Direct Orange 119	*add*	Diazol Light Orange 44GS ..... Fran
2110	CI Direct Orange 120	*add*	Diazol Light Orange 45GS ..... Fran
2111	CI Direct Orange 121	*add*	Diazol Light Orange 46GS ..... Fran
2112	CI Direct Orange 122	*add*	Diazol Light Orange 47GS ..... Fran
2113	CI Direct Orange 123	*add*	Diazol Light Orange 48GS ..... Fran
2114	CI Direct Orange 124	*add*	Diazol Light Orange 49GS ..... Fran
2115	CI Direct Orange 125	*add*	Diazol Light Orange 50GS ..... Fran
2116	CI Direct Orange 126	*add*	Diazol Light Orange 51GS ..... Fran
2117	CI Direct Orange 127	*add*	Diazol Light Orange 52GS ..... Fran
2118	CI Direct Orange 128	*add*	Diazol Light Orange 53GS ..... Fran
2119	CI Direct Orange 129	*add*	Diazol Light Orange 54GS ..... Fran
2120	CI Direct Orange 130	*add*	Diazol Light Orange 55GS ..... Fran
2121	CI Direct Orange 131	*add*	Diazol Light Orange 56GS ..... Fran
2122	CI Direct Orange 132	*add*	Diazol Light Orange 57GS ..... Fran
2123	CI Direct Orange 133	*add*	Diazol Light Orange 58GS ..... Fran
2124	CI Direct Orange 134	*add*	Diazol Light Orange 59GS ..... Fran
2125	CI Direct Orange 135	*add*	Diazol Light Orange 60GS ..... Fran
2126	CI Direct Orange 136	*add*	Diazol Light Orange 61GS ..... Fran
2127	CI Direct Orange 137	*add*	Diazol Light Orange 62GS ..... Fran
2128	CI Direct Orange 138	*add*	Diazol Light Orange 63GS ..... Fran
2129	CI Direct Orange 139	*add*	Diazol Light Orange 64GS ..... Fran
2130	CI Direct Orange 140	*add*	Diazol Light Orange 65GS ..... Fran
2131	CI Direct Orange 141	*add*	Diazol Light Orange 66GS ..... Fran
2132	CI Direct Orange 142	*add*	Diazol Light Orange 67GS ..... Fran
2133	CI Direct Orange 143	*add*	Diazol Light Orange 68GS ..... Fran
2134	CI Direct Orange 144	*add*	Diazol Light Orange 69GS ..... Fran
2135	CI Direct Orange 145	*add*	Diazol Light Orange 70GS ..... Fran
2136	CI Direct Orange 146	*add*	Diazol Light Orange 71GS ..... Fran
2137	CI Direct Orange 147	*add*	Diazol Light Orange 72GS ..... Fran
2138	CI Direct Orange 148	*add*	Diazol Light Orange 73GS ..... Fran
2139	CI Direct Orange 149	*add*	Diazol Light Orange 74GS ..... Fran
2140	CI Direct Orange 150	*add*	Diazol Light Orange 75GS ..... Fran
2141	CI Direct Orange 151	*add*	Diazol Light Orange 76GS ..... Fran
2142	CI Direct Orange 152	*add*	Diazol Light Orange 77GS ..... Fran
2143	CI Direct Orange 153	*add*	Diazol Light Orange 78GS ..... Fran
2144	CI Direct Orange 154	*add*	Diazol Light Orange 79GS ..... Fran
2145	CI Direct Orange 155	*add*	Diazol Light Orange 80GS ..... Fran
2146	CI Direct Orange 156	*add*	Diazol Light Orange 81GS ..... Fran
2147	CI Direct Orange 157	*add*	Diazol Light Orange 82GS ..... Fran
2148	CI Direct Orange 158	*add*	Diazol Light Orange 83GS ..... Fran
2149	CI Direct Orange 159	*add*	Diazol Light Orange 84GS ..... Fran
2150	CI Direct Orange 160	*add*	Diazol Light Orange 85GS ..... Fran
2151	CI Direct Orange 161	*add*	Diazol Light Orange 86GS ..... Fran
2152	CI Direct Violet 31	*delete*	Diazol Brilliant Violet 2B ..... Fran

Page	Colour Index Designation			
2006	CI Direct Yellow 8	*add*	Direct Yellow 6G	Vond
2008	CI Direct Yellow 11	*add*	Direct Yellow RN	Vond
2009	CI Direct Yellow 12	*add*	Chrysophenine G	Adel
2059	CI Direct Orange 60	*delete*	Calcodur Orange E3GL	CCC
2062	CI Direct Orange 69	*delete*	Diazol Light Orange R	Fran

Page	Colour Index Designation			
2063	CI Direct Orange 73	*add*	Diazamine Orange N	Fran
2070	CI Direct Orange 90	*delete*	Diazamine Brilliant Orange 2RN	Fran
2072		*delete*	CI Direct Orange 95	
2073		*delete*	CI Direct Orange 98	
2075	CI Direct Red 1	*add*	Chrome Leather Red F extra	Fran
2082	CI Direct Red 20	*delete*	Diazol Pink B	Fran
2083	CI Direct Red 23	*add*	Enianil Fast Scarlet 4BS	Enia
2084	CI Direct Red 24	*add*	Erie Fast Scarlet 4BSH	NAC
2085	CI Direct Red 26	*add*	Enianil Fast Scarlet 8BS	Enia
2086	CI Direct Red 28	*add*	Congo Red	Adel
2087	CI Direct Red 31	*add*	Direct Red 12B	Vond
		add	Enianil Fast Brilliant Red 12B	Enia
2088	CI Direct Red 33	*delete*	Diazol Fast Red FB	Fran
2097	CI Direct Red 61	*add*	Diazol Purpurine 9BN	Fran
2098		*delete*	CI Direct Red 66	
2101	CI Direct Red 75	*add*	Triantine Fast Pink B	Vond
	CI Direct Red 76	*add*	Tetramine Fast Scarlet GD	NCF
2102	CI Direct Red 77	*add*	Tetramine Fast Bordeaux 5B extra	NCF
2103	CI Direct Red 79	*add*	Tetramine Fast Red 6BL	NCF
		add	Triantine Fast Red 4BL	Vond
	CI Direct Red 80	*add*	Diazol Light Red 3B	Fran
		add	Triantine Fast Red F3B	Vond
2104	CI Direct Red 81	*add*	Tetramine Fast Red 8B	NCF
2105	CI Direct Red 83	*add*	Tetramine Fast Rubine BBLD	NCF
	CI Direct Red 84	*add*	Triantine Fast Brown 3RL	Vond
2110	CI Direct Red 99	*add*	Tetramine Fast Bordeaux RLL	NCF
2113	CI Direct Red 108	*add*	Tetramine Fast Red 6B	NCF
2115	CI Direct Red 113	*add*	Tetramine Fast Scarlet B extra	NCF
2117	CI Direct Red 117	*add*	Pontamine Diazo Red 7BL	DuP
2121	CI Direct Red 127-127A under CI Direct Red 127—CI 28215	*add*	Pontamine Diazo Bordeaux 2BL	DuP
		add	Diazamine Light Bordeaux 2BN	Fran
	under CI Direct Red 127 or 127A	*delete*	Pontamine Diazo Bordeaux 2BL	DuP
2130	CI Direct Red 153	*delete*	Pontamine Diazo Red 7BL	DuP
2134	CI Direct Red 169	*delete*	Paradiazol Bordeaux B	Fran
2144	CI Direct Violet 3	*delete*	Diazol Violet RS	Fran
2145	CI Direct Violet 8	*delete*	Diazol Brilliant Violet B	Fran
2146	CI Direct Violet 9	*add*	Diazol Brilliant Violet B	Fran
		add	Enianil Brilliant Violet B	Enia
		transfer	Pontamine Brilliant Violet BN from "similar" listing to "identical"	DuP
2150	CI Direct Violet 22	*delete*	Diazol Violet BS	Fran
2152	CI Direct Violet 31	*delete*	Diazol Brilliant Violet 2B	Fran
2155	CI Direct Violet 42	*delete*	Diazol Violet 2BR	Fran
	CI Direct Violet 43	*delete*	Diazol Violet R	Fran
2157	CI Direct Violet 48 under "The following brands are similar"	*add*	Tetramine Fast Violet B extra	NCF
		delete	Diazol Light Violet BLN	Fran
2158	CI Direct Violet 51	*add*	Tetramine Fast Violet BB extra	NCF
		transfer	Pontamine Fast Heliotrope B from "similar" listing to "identical"	DuP
2160	CI Direct Violet 57	*add*	Diazol Light Violet BMA	Fran
		delete	CI Direct Violet 58	
2161		*delete*	CI Direct Violet 61	
2162	CI Direct Violet 66	*add*	Diazol Light Violet BLN	Fran
2164	CI Direct Violet 72	*delete*	Diazamine Light Violet TRL	Fran
2170	CI Direct Blue 2	*delete*	Diazamine Black BH	Fran
2172	CI Direct Blue 6	*delete*	Diazamine Grey 2B	Fran
2173	CI Direct Blue 8	*add*	Benzoazurine G	Adel
2176	CI Direct Blue 15	*add*	Direct Blue HH	Vond
2181	CI Direct Blue 26	*delete*	Metadiazol Blue R	Fran
2182	CI Direct Blue 29	*delete*	Viscose Blue 3R	Fran
2187	CI Direct Blue 48	*add*	Diazamine Black R	Fran
		add	Diazol Dark Violet N	Fran
2193	CI Direct Blue 67	*add*	Tetramine Fast Blue D3R extra	NCF
		add	Triantine Fast Blue F3R	Vond
2194	CI Direct Blue 69	*add*	Triantine Fast Blue BR	Vond
2195	CI Direct Blue 71	*add*	Tetramine Fast Blue B2R extra	NCF
		transfer	Pontamine Fast Blue SFL from "similar" listing to "identical"	DuP
2196	CI Direct Blue 75	*delete*	Pontamine Fast Blue 2GL	DuP
2197	CI Direct Blue 76	*add*	Diazol Light Blue 7JL	Fran
		add	Solar Blue 4GL	S
2198	CI Direct Blue 78	*add*	Diazol Light Blue 3J	Fran
		add	Solex Blue GLL	Adel
		add	Tetramine Fast Blue B extra	NCF
2199	CI Direct Blue 80	*add*	Pontamine Fast Blue 3RLN, 3RLP	DuP
	CI Direct Blue 82	*add*	Pontamine Fast Blue 2GL	DuP
2200	CI Direct Blue 84	*add*	Tetramine Fast Blue GB extra	NCF
2201	CI Direct Blue 86	*add*	Tetramine Fast Blue D extra green	NCF
		add	Triantine Fast Turquoise GL	Vond
		add	Turquoise GLL	Adel
2205	CI Direct Blue 98	*add*	Solex Blue, FBGL, RL	Adel
2208	CI Direct Blue 106	*add*	Solex Sky Blue GL	Adel
		add	Triantine Fast Blue VLL	Vond
2209	CI Direct Blue 110	*delete*	Diazol Light Blue J	Fran
	CI Direct Blue 111	*delete*	Diazol Light Blue 3J	Fran
2211	CI Direct Blue 116	*delete*	Diazol Light Violet 4B	Fran

Page	Colour Index Designation		
2213	CI Direct Blue 120-120A under CI Direct Blue 120	*delete*	Pontamine Diazo Blue BR ... DuP
		add	Diazamine Leather Blue BR ... Fran
	under CI Direct Blue 120A	*add*	Pontamine Diazo Blue BR ... DuP
	CI Direct Blue 121	*delete*	Diazamine Blue B2R ... Fran
2214	CI Direct Blue 124	*delete*	Diazamine Pure Blue 6B ... Fran
2215	CI Direct Blue 128	*delete*	Diazamine Pure Blue 4B ... Fran
2216	CI Direct Blue 129	*delete*	Diazamine Blue 2B ... Fran
2224	CI Direct Blue 151	*add*	Cotton Blue CVB ... Adel
		add	Enianil Blue CVB,CVBO ... Enia
2225	CI Direct Blue 153	for	Cupramina Blue GL ... Acna (*see A & A* p 4566)
		read	Cupramine Blue GL ... Acna (correct as originally printed)
2227	CI Direct Blue 158	*add*	Cuprodiazol Light Blue NL ... Fran
2233	CI Direct Blue 174	for	Cupramine Violet 2BL ... Acna (*see A & A* page 4566)
		read	Cupramina Violet 2BL ... Acna (correct as originally printed)
2239	CI Direct Green 6	*add*	Diazol Green B ... Fran
		add	Enianil Green BBN ... Enia
2240	CI Direct Green 8	*add*	Cotton Green G ... Adel
2241	CI Direct Green 12	*add*	Chloramine Green B ... Adel
2247	CI Direct Green 26	*add*	Diazol Light Green BMA ... Fran
		add	Tetramine Fast Green B extra ... NCF
	CI Direct Green 27	*add*	Solantine Blue Green BFL ... NAC
		transfer	Pontamine Fast Green 5BL ... DuP from "similar" listing to "identical"
2260		*delete*	CI Direct Green 56
2261	CI Direct Green 58	*delete*	Diazamine Green B ... Fran
		delete	Paradiazol Green B ... Fran
	CI Direct Green 60	*delete*	Paradiazol Green J ... Fran
2263	CI Direct Brown 1-1A under CI Direct Brown 1	*delete*	Benzo Brown D3GA-CF ... G
		delete	Pontamine Brown D3GN ... DuP
		delete	Pontamine Brown NCR ... DuP (*see A & A* p 4566)
		delete	Pontamine Brown N3G ... DuP
		add	Honey Yellow 3GN ... Adel
	under "The following brands are similar"	*add*	Direct Brown G ... Vond
	under CI Direct Brown 1A	*add*	Benzo Brown D3GA-CF ... G
		add	Honey Yellow 3GNT ... Adel
		add	Pontamine Brown D3GN, NCR ... DuP

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2266	CI Direct Brown 6	*delete*	Diazol Brown J ... Fran
		delete	Union Brown JO ... Fran
	CI Direct Brown 7	*delete*	Diazol Brown N ... Fran
		delete	Paradiazol Brown N ... Fran
2270	CI Direct Brown 20	*delete*	Diazol Brown FBR ... Fran
2271	CI Direct Brown 24	*delete*	Diazol Brown EBR ... Fran
2275	CI Direct Brown 31	*add*	Trisulphone Brown B ... Adel
2276	CI Direct Brown 33	*add*	Enianil Fast Catechine B ... Enia
2283	CI Direct Brown 51	*delete*	Diazol Bronze JM ... Fran
2290	CI Direct Brown 73	*delete*	Diazol Cutch BR ... Fran
2291	CI Direct Brown 74	*delete*	Pontamine Catechu 3GD ... DuP
2295	CI Direct Brown 95	*add*	Enianil Light Brown BRL ... Enia
		add	Pontamine Fast Brown NP ... DuP
		add	Solex Brown R ... Adel
		add	Tetramine Fast Brown BRS ... NCF
2296	CI Direct Brown 99	*delete*	Diazol Light Brown 3R ... Fran
2297	CI Direct Brown 101	*add*	Tetramine Fast Brown RT extra ... NCF
2301	CI Direct Brown 112	*add*	Triantine Fast Brown 8RL ... Vond
		transfer	Pontamine Fast Brown 8RL ... DuP from "similar" listing to "identical"
2311		*delete*	CI Direct Brown 143
		delete	CI Direct Brown 144
2312	CI Direct Brown 149	*delete*	Paradiazol Brown S ... Fran
	CI Direct Brown 150	*delete*	Paradiazol Brown BD ... Fran
2314	CI Direct Brown 154	*add*	Pontamine Brown N3G ... DuP
		delete	CI Direct Brown 155
2315	CI Direct Brown 158	*delete*	Metadiazol Brown JO ... Fran
	CI Direct Brown 159	*delete*	Paradiazol Bronze J ... Fran
2316	CI Direct Brown 160	for	Cupramine Brown 2GL ... Acna (*see A & A* p 4567)
		read	Cupramina Brown 2GL ... Acna (correct as originally printed)
2319	CI Direct Brown 171	*delete*	Paradiazol Brown RD ... Fran
2326	CI Direct Black 4	*add*	Cotton Black MT ... Adel
	CI Direct Black 5 in the heading	*add*	Polyazo
		add	Diazol Black JMA ... Fran

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2328	CI Direct Black 9	*delete*	Diazol Fast Black FB ... Fran

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2394	CI Sulfur Brown 4		

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	under CI Direct Brown 1A	*add*	Benzo Brown D3GA-CF	G
		add	Honey Yellow 3GNT	Adel
		add	Pontamine Brown D3GN, NCR	DuP
2326	CI Direct Black 4	*add*	Cotton Black MT	Adel
	CI Direct Black 5 in the heading	*add*	Polyazo	
		add	Diazol Black JMA	Fran
2328	CI Direct Black 9	*delete*	Diazol Fast Black FB	Fran
			Pontamine Fast Black FF has the constitution CI 31565	DuP
2333	CI Direct Black 22	*add*	Benzonerol Black VS	Adel
		add	Diazol Fast Black JN	Fran
2335	CI Direct Black 28	*delete*	Viscose Black R	Fran
2336	CI Direct Black 32	*add*	Diazol Fast Black JRA	Fran
2339	CI Direct Black 38	*transfer*	Pontamine Black ULR from "identical" listing to "similar"	DuP
2340		*delete*	CI Direct Black 46	
2342	CI Direct Black 51	*delete*	Pontamine Fast Black LCW	DuP
		add	Diazol Fast Grey L	Fran
		add	Enianil Fast Grey LSN	Enia
		add	Enianil Light Black L	Enia
		add	Solex Grey L	Adel
		add	Tetramine Fast Black O extra	NCF
2348		*delete*	CI Direct Black 70	
2349	CI Direct Black 71	*add*	Tetramine Fast Grey VG extra	NCF
2350	CI Direct Black 74	*delete*	Diazol Light Grey 4B	Fran
2352	CI Direct Black 78	*delete*	Diazamine Black V	Fran
2354		*delete*	CI Direct Black 84	
2355		*delete*	CI Direct Black 85	
2357		*delete*	CI Direct Black 93	
2359		*delete*	CI Direct Black 98	
2364	CI Sulfur Yellow 4	*add*	Sulfer Yellow 3GN	Vond
2370	CI Sulfur Orange 3	*add*	Sulfanol Orange, MJ, MR	Fran
2371	CI Sulfur Red 1	*delete*	Sulfanol Bordeaux R (*see A & A* p 4567)	Fran
2372	CI Sulfur Red 3	*add*	Sulfanol Bordeaux R	Fran
		add	Sulfanol Prune B	Fran
2373	CI Sulfur Red 6 under "Applied by method 1"	*delete*	Sulfanol Prune B (*see A & A* p 4567)	Fran
2377	CI Sulfur Blue 1	*add*	Sulfanol Blue B, RB Applied by method 3	Fran
	CI Solubilized Sulfur Blue 1	*add*	Sulfanosol Blue RB	Fran
2381	CI Sulfur Blue 9 under "Applied by method 1"	*delete*	Sulfanol Blue B	Fran
2383	CI Sulfur Blue 14	*add*	Sulfer Brilliant Blue G	Vond
2384	CI Sulfur Blue 15	*add*	Sulfer Green Blue CV	Vond
2385	CI Solubilized Sulfur Green 2 under "Applied by method 3"	*add*	Sulfanosol Green 2B	Fran
2393	CI Sulfur Brown 1	*delete*	Cachou de Laval JS, RS, S	Fran
		delete	Sulfanol Olive TR	Fran
2394	CI Sulfur Brown 4 under "Applied by method 1"	*delete*	Sulfanol Brown BJ	Fran
		delete	Sulfanol Yellow Brown BR	Fran
		add	Cachou de Laval JS, RS	Fran
		add	Sulfanol Olive TR	Fran
2397	CI Sulfur Brown 12	*add*	Sulphur Brown 3R	Adel
2398	CI Sulfur Brown 14	*add*	Sulfanol Brown TR	Fran
	CI Sulfur Brown 15	*add*	Sulfanol Brown BR	Fran
	CI Solubilized Sulfur Brown 15 under "Applied by method 3"	*add*	Sulfanosol Brown BR	Fran
2400	CI Sulfur Brown 20	*add*	Sulfogene Brown RNCF	DuP
	CI Sulfur Brown 21	*add*	Sulfanol Olive Yellow 5J	Fran
2406	CI Sulfur Brown 42 under "Applied by method 1"	*delete*	Thiocutch RS	Fran
2412		*delete*	CI Sulfur Brown 61	
2413	CI Sulfur Black 1	*add*	Sulfanol Black MBS, MRS	Fran
	CI Solubilized Sulfur Black 1 under "Applied by method 3"	*add*	Sulfanosol Black B	Fran
		add	Sulfur Black BGS Solution	NAC
		add	Sulfur Black BGLS Solution	NAC
2414	CI Sulfur Black 2 under "Applied by method 1"	*add*	Sulfanol Black 2R	Fran
		add	Sulfogene Gray H Grains	DuP
	CI Solubilized Sulfur Black 2 under "Applied by method 3"	*add*	Sulfanosol Printing Black 2R	Fran
		add	Sulfur Black RS Solution	NAC
	under "Applied by method 6"	*add*	Thioblack BRS 80, B2RS 80	Fran
	CI Sulfur Black 3 under "Applied by method 1"	*delete*	Vidal Olive S	Fran
2415	CI Sulfur Black 6 under "Applied by method 1"	*delete*	Sulfanol Fast Black CLG	Fran
		add	Solane Black CLJ	Fran
2416	CI Sulfur Black 10 in the heading	*add*	CI Solubilized Sulfur Black 10	
		add	CI Solubilized Sulfur Black 10 Applied by method 3 Sulfur Black 8GATS Solution	NAC

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2417	CI Sulfur Black 11 under "Applied by method 1"	*delete*	Sulfanol Fast Black CL (*see A & A* p 4567)	Fran
		add	Solane Black CL, CLN	Fran
	CI Solubilized Sulfur Black 11 under "Applied by method 3"	*add*	Sulfocarbon Black CGLS	NAC
		add	Applied by method 4 Heliasol Black CLN	Fran
2428	CI Vat Yellow 2	*add*	Ponsol Flavone GCN, GCND	DuP
2430	CI Vat Yellow 4	*delete*	Ponsol Golden Yellow GK	DuP
		add	Romantrene Golden Yellow FGK	Acna
2432	CI Vat Yellow 9	*delete*	Solanthrene Yellow JF	Fran
2437	CI Vat Yellow 21	*delete*	Heliane Yellow R	Fran
2444	CI Vat Orange 2	*add*	Pernithrene Orange RRTS	Vond
		add	Solanthrene Orange 2R	Fran
	CI Solubilized Vat Orange 2	*add*	Solvat Golden Orange RRT	NAC
2445	CI Solubilized Vat Orange 3	*add*	Solasol Brilliant Orange RS	Fran
2446	CI Vat Orange 4	*add*	Solanthrene Orange 4R	Fran
2454	CI Vat Orange 20	*delete*	Solanthrene Orange 5J	Fran
	CI Vat Orange 21	*delete*	Solanthrene Orange 4J	Fran
2455	CI Vat Red 1	*add*	Solanthrene Brilliant Pink RF	Fran
2458	CI Vat Red 6	*add*	Solanthrene Scarlet B	Fran
	CI Solubilized Vat Red 6	*add*	Solasol Scarlet BS	Fran
2460	CI Vat Red 10	*add*	Pernithrene Red FBB	Vond
2462	CI Vat Red 13	*add*	Carbanthrene Red G2BP	NAC
2467	CI Vat Red 26	*delete*	Heliane Scarlet R	Fran
2473	CI Vat Red 41	*add*	Heliane Red 5B	Fran
2474	CI Vat Red 42	*delete*	Solanthrene Red 5J	Fran
2479	CI Vat Violet 1	*delete*	Ponsol Violet RR	DuP
		delete	Solanthrene Brilliant Violet 3R	Fran
	CI Solubilized Vat Violet 1	*add*	Solasol Brilliant Violet 4RS	Fran
2485	CI Vat Violet 9	*add*	Solanthrene Brilliant Violet 3B	Fran
2488	CI Vat Violet 15	*delete*	Solanthrene Brilliant Violet 2B	Fran
2489	CI Vat Violet 17	*delete*	Solanthrene Brilliant Violet R	Fran
2491	CI Vat Blue 1	*add*	Synthetic Indigo TS	Fran
	CI Reduced Vat Blue 1	*add*	Reduced Indigo Solution C	Fran
		add	Reduced Synthetic Indigo Grains	Fran
	CI Reduced Vat Blue 1A	*add*	Reduced Indigo Solution L	Fran
	CI Solubilized Vat Blue 1	*delete*	Solasol Indigo N	Fran

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2494	CI Vat Blue 4 under "Purified forms"	*add*	Pernithrene Blue RS	Vond
		delete	Solanthrene Brilliant Blue R	Fran
		add	Solanthrene Blue R for sugar	Fran
	under "Special physical forms for paper, lacquers, etc	*add*	Lutetia Fast Blue RS	Fran
		add	Latexol Fast Blue SD	Fran
		add	Celloide Blue RN	Fran
		add	Vulcafix Fast Blue SD	Fran
2495	CI Vat Blue 5	*delete*	Indigo 4BR	Fran
		delete	"The following brands are similar" Sulfanthrene Blue 2BD, 2BP	DuP
		transfer	Sulfanthrene Blue 2B from "similar" listing to "identical"	DuP
	CI Solubilized Vat Blue 5	*add*	Solasol Indigo 4B	Fran
2496	CI Vat Blue 6	*delete*	Indanthrone Blue	DuP
		add	Pernithrene Blue BC	Vond
		add	Ponsol Blue BFP	DuP
	under "The following brands are similar"	*add*	Solanthrene Brilliant Blue RCL	Fran
2499	CI Vat Blue 11	*delete*	Solanthrene Blue JN	Fran
2500	CI Vat Blue 12	*delete*	Solanthrene Blue 3J	Fran
2501	CI Vat Blue 14	*add*	Pernithrene Blue GCD	Vond
	CI Vat Blue 15	*delete*	Solanthrene Blue 3JF	Fran
2502	CI Vat Blue 16	*add*	Ponsol Navy Blue	DuP
2503	CI Vat Blue 18	*add*	Ponsol Navy Blue RAD	DuP
	under "The following brands are similar"	*delete*	Solanthrene Navy Blue RF	Fran
2504	CI Vat Blue 20	*add*	Pernithrene Dark Blue BOA	Vond
2510	CI Vat Blue 34	*add*	Reduced Indigo Solution 2R	Fran
2514	CI Vat Blue 43	*add*	Redon Blue 2R, RWO, 2RWO	Vond
2519	CI Vat Green 1	*delete*	Solanthrene Brilliant Green J	Fran
		add	Ponsol Jade Green Supra D	DuP
		add	Pernithrene Brilliant Green 7FB	Vond
2520	CI Vat Green 2	*add*	Pernithrene Brilliant Green GG	Vond
		add	Solanthrene Brilliant Green J	Fran
2521	CI Vat Green 3	*add*	Pernithrene Olive Green B	Vond
2523	CI Vat Green 5	*add*	Solanthrene Olive Green 2J	Fran
2524	CI Vat Green 8	*delete*	Solanthrene Khaki 2J	Fran
		add	Pernithrene Khaki GG	Vond
2525	CI Vat Green 9	*add*	Solanthrene Black 3BA	Fran
2527	CI Vat Green 14	*add*	Pernithrene Olive GG	Vond
2528	CI Vat Green 17	*add*	Solanthrene Olive 3J	Fran
2532	CI Vat Brown 3	*add*	Pernithrene Brown R	Vond
	under "Purified brands"	*delete*	Solanthrene Brown RF	Fran

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2539	CI Vat Brown 20	*add*	Ponsol Brown BN	DuP

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2644	CI Azoic Red 12	*add*	Ronagen Red FTR	RL
		add	Sinogen Red FTR	RL

	CI Reduced Vat Blue 1A	*add*	Reduced Indigo Solution L	Fran
	CI Solubilized Vat Blue 1	*delete*	Solasol Indigo N	Fran
2528	CI Vat Green 17	*add*	Solanthrene Olive 3J	Fran
2532	CI Vat Brown 3 under "Purified brands"	*add*	Pernithrene Brown R	Vond
		delete	Solanthrene Brown RF	Fran

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2539	CI Vat Brown 20	*add*	Ponsol Brown BN	DuP
2551	CI Vat Black 1	*add*	Solanthrene Printing Black BLN, TL, TLN	Fran
2554	CI Vat Black 9	*add*	Solanthrene Direct Black RB	Fran
2560	CI Vat Black 25	*add*	Ponsol Olive TR	DuP
2561	CI Vat Black 27	*add*	Pernithrene Olive R	Vond
	CI Vat Black 28	*delete*	Solanthrene Grey N	Fran
2575	CI Azoic Diazo Component 5	*add*	Naphthanil Red B Base	DuP
2592	CI Azoic Diazo Component 32	*add*	Naphthanil Red KBH	DuP
		add	Naphthanil Red KBO Base	DuP
2595	CI Azoic Diazo Component 35	*add*	Blue 3BVS Salt	NAC
2609	CI Azoic Diazo Component 49	*add*	Orange RF Salt	NAC
2612	CI Azoic Diazo Component 109 (new entry, see *A & A* List No. 4)	*add*	Black BS Salt	NAC
2613	CI Azoic Coupling Component 2	*delete*	Naphthanil AS for Lakes	DuP
		add	Naphthanil AS Solution	DuP
2614	CI Azoic Coupling Component 4	*delete*	Naphthanil BO	DuP
2617	CI Azoic Coupling Component 13	*delete*	Naphthanil SG soln	DuP
	CI Azoic Coupling Component 15	*add*	Naphthanil LB	DuP
	CI Azoic Coupling Component 16	*add*	Naphthanil DB	DuP
2623	CI Azoic Coupling Component 35	*add*	Naphthanil LG	DuP
2629	CI Azoic Yellow 1	*add*	Diagen Yellow AY	DuP
		add	Eniagem Yellow GS	Enia
	CI Azoic Yellow 2	*add*	Eniagem Yellow 3G	Enia
2630	CI Azoic Yellow 6	*add*	Ronagen Golden Yellow FG	RL
		add	Sinagen Golden Yellow FG	RL
2631	CI Azoic Yellow 9	*add*	Ronagen Yellow F3G	RL
2632	CI Azoic Yellow 11	*add*	Ronagen Yellow F4G	RL
2635	CI Azoic Orange 2	*add*	Eniagem Orange G	Enia
2636	CI Azoic Orange 5	*add*	Ronagen Orange FRR	RL
	CI Azoic Orange 6	*add*	Ronagen Orange FGN	RL
2641	CI Azoic Red 1	*add*	Ronagen Scarlet FR, FRS	RL
		add	Sinagen Scarlet FR	RL
		add	Eniagem Scarlet RS, RSC	Enia
	CI Azoic Red 2	*add*	Eniagem Red RS	Enia
2642	CI Azoic Red 6	*add*	Eniagem Red GS	Enia
2643	CI Azoic Red 9	*add*	Ronagen Scarlet FL	RL

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2644	CI Azoic Red 12	*add*	Ronagen Red FTR	RL
		add	Sinagen Red FTR	RL
	CI Azoic Red 15	*add*	Eniagem Red FFBB	Enia
2647	CI Azoic Red 24	*add*	Ronagen Bordeaux FB	RL
		add	Sinagen Bordeaux FB	RL
2655	CI Azoic Red 65 (new entry, *see A & A* List No. 2)	*add*	Ronagen Red F4G	RL
2657	CI Azoic Violet 1	*add*	Eniagem Violet B	Enia
	CI Azoic Violet 3	*add*	Ronagen Corinth FB	RL
2661	CI Azoic Blue 1	*add*	Ronagen Navy Blue FB	RL
2662	CI Azoic Blue 6	*add*	Eniagem Blue B	Enia
2663	CI Azoic Blue 9	*add*	Eniagem Navy Blue B, R	Enia
	CI Azoic Blue 11	for	Citazina Blue CB (*see A & A* p 4571)	Acna
		read	Citazene Blue CB (correct as originally printed)	Acna
2667	CI Azoic Green 1	*add*	Eniagem Green B	Enia
2669	CI Azoic Brown 2	*add*	Ronagen Brown FR	RL
2670	CI Azoic Brown 7	*add*	Ronagen Brown FB	RL
		add	Sinagen Brown FB	RL
2671	CI Azoic Brown 11	*add*	Ronagen Brown FBR	RL
2672	CI Azoic Brown 14	*add*	Ronagen Olive Brown FG	RL
	CI Azoic Brown 15	*add*	Ronagen Brown FRR	RL
2673	CI Azoic Brown 17	*add*	Ronagen Black Brown FTR	RL
2678	CI Azoic Black 5	for	Citazina Black CS (*see A & A* p 4571)	Acna
		read	Citazene Black CS (correct as originally printed)	Acna
	CI Azoic Black 7 (new entry, *see A & A* List No. 2)	*add*	Ronagen Black FL	RL
		add	Sinagen Black FL	RL
2703	CI Pigment Yellow 1	*add*	Horicon Yellow X-1351	IMP
		add	Burma Yellow X-1622	IMP
		add	Brazil Yellow X-2866	IMP
		add	Hansa Yellow S-3155	IMP
2704	CI Pigment Yellow 3	*add*	Iroquois Yellow X-1285	IMP
2705	CI Pigment Yellow 5	*add*	Yellow Toner X-1954	IMP
2706	CI Pigment Yellow 10	*add*	Pigment Yellow X	Adel
2707	CI Pigment Yellow 12	*add*	Verona Yellow X-1791	IMP
		add	Amazon Yellow X-2485	IMP
		add	Klondike Yellow X-2261	IMP
	CI Pigment Yellow 13	*add*	Saranac Yellow X-2838	IMP
2708	CI Pigment Yellow 14	*add*	Sumatra Yellow X-1940	IMP
		add	Sacandaga Yellow X-2476	IMP

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2712	CI Pigment Yellow 32			
		add	Strontium Chromate X-2396	IMP
2713	CI Pigment Yellow 34			
		add	CP Chrome Yellow Light	IMP
		add	CP Chrome Yellow Medium	IMP
		add	CP Chrome Yellow Primrose	IMP
		add	to manufacturers' initials	IMP
	CI Pigment Yellow 35			
		add	Lithopone Cadmium Yellow Deep	IMP
		add	Lithopone Cadmium Yellow Golden	IMP
		add	Lithopone Cadmium Yellow Lemon	IMP
		add	Lithopone Cadmium Yellow Primrose	IMP
2714	CI Pigment Yellow 36			
		add	CP Zinc Yellow X-883	IMP
		add	CP Zinc Yellow X-2127	IMP
		add	Basic Zinc Chromate X-2259	IMP
	CI Pigment Yellow 37			
		add	Cadmium Yellow Conc Deep	IMP
		add	Cadmium Yellow Conc Golden	IMP
		add	Cadmium Yellow Conc Lemon	IMP
		add	Cadmium Yellow Conc Primrose	IMP
		add	to manufacturers' initials	IMP
2719	CI Pigment Orange 2	*add*	Ozark Orange X-1481	IMP
2720	CI Pigment Orange 5	*add*	Nippon Orange X-881	IMP
2722	CI Pigment Orange 13			
		add	Oswego Orange X-2065	IMP
	CI Pigment Orange 15			
		add	Orange Toner X-2692	IMP
2723	CI Pigment Orange 16			
		add	Madras Toner X-1843	IMP
	CI Pigment Orange 17 under "Aluminum lake"	*add*	Tangarine Lake X-917	IMP
2724	CI Pigment Orange 20			
		add	Cadmium Orange	IMP
	CI Pigment Orange 21			
		add	Chrome Orange	IMP
2725	CI Pigment Red 1	*add*	Para Toner Light A-4329	IMP
		add	Para Toner Deep A-1757	IMP
	CI Pigment Red 2	*add*	Revere Red X-2198	IMP
2726	CI Pigment Red 3	*add*	CP Toluidine Toner A-2989, A-2990	IMP
		add	CP Toluidine Toner Deep X-1865	IMP
		add	Enialit Light Red RL	Enia
		add	Toluidine Toner HR X-2700, X-2741	IMP
2726	CI Pigment Red 3	*add*	Toluidine Toner Deep HR X-2742	IMP
		add	Segnale Light Red BR	Acna
2727	CI Pigment Red 4	*add*	Tanager Red X-761	IMP
	CI Pigment Red 5	*add*	Marcy Red X-2640	IMP
	CI Pigment Red 6	*add*	Oneida Red X-2066	IMP
2730	CI Pigment Red 13	*add*	Tioga Maroon X-1997	IMP
2732	CI Pigment Red 22	*add*	Sparta Red Red X-2593	IMP
	CI Pigment Red 23	*add*	Malta Red X-2284	IMP
2739	CI Pigment Red 48			
	under "Calcium lake"	*add*	Monterey Red X-2277	IMP
		add	Segnale Red RS	Acna
	under "Barium lake"	*add*	Orono Red X-2478	IMP
		add	Segnale Red GS	Acna
	under "Manganese lake"	*add*	Montauk Red X-2218	IMP
2740	CI Pigment Red 49 under "Sodium salt"	*add*		
2741	under "Calcium lake"	*add*	Lithol Toner Y A-8003	IMP
		add	Lithol Toner Deep X-957	IMP
		add	Rubber Red X-1148	IMP
		add	Winthrop Red X-1666	IMP
			Tucson Maroon X-1779	IMP
	under "Barium lake"			
		add	Lithol Toner Light X-1095	IMP
		add	Lithol Toner Medium X-1096	IMP
		add	Pitcairn Red X-1585	IMP
		add	Red Toner Light X-1723	IMP
2743	CI Pigment Red 53 under "Barium lake"			
		add	Mohican Red A-8008	IMP
		add	Wayne Red X-2486	IMP
2744	CI Pigment Red 54	*add*	Uncas Maroon X-1972	IMP
2745	CI Pigment Red 57 under "Calcium lake"	*add*	Selkirk Red X-2028	IMP
2747	CI Pigment Red 60 under "Barium lake"			
		add	Pigment Scarlet 3BL	Acna
2748	CI Pigment Red 63 under "Calcium lake"	*add*	Cayuga Maroon A-4372	IMP
	under "Manganese lake"	*add*	Maroon Toner X-1455	IMP
2753	CI Pigment Red 81	*add*	Sicilian Rose Toner A-7143	IMP
		add	Rose Toner X-1143	IMP
2754	CI Pigment Red 83	*add*	Madder Lake X-686	IMP

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2756	CI Pigment Red 90			
		add	Ruby Red Toner X-1356	IMP
2818	CI Solvent Yellow 5	*add*	Ext D&C Yellow No. 9	AAP, CCC, DC, KO, NAC, WI

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		add	CP Toluidine Toner Deep X-1865	IMP
		add	Enialit Light Red RL	Enia
		add	Toluidine Toner HR X-2700, X-2741	IMP
2756	CI Pigment Red 90 under "Lead lake"	*add*	Phlox Red Toner X-1356	IMP
2760	CI Pigment Red 104	*add*	Rex Orange all shades	IMP
2762	CI Pigment Red 108	*add*	Cadmium Red all shades	IMP
2763	CI Pigment Violet 1	*add*	Cerise Toner X-1127	IMP
		add	Sicilian Cerise Toner A-7127	IMP
2764	CI Pigment Violet 3	*add*	Sicilian Purple X-1467	IMP
		add	Violet Toner X-1387, X-2698	IMP
2765	CI Pigment Violet 5 under "Aluminum lake"	*add*	Morocco Maroon X-1550	IMP
		add	Suez Maroon A-4373	IMP
		delete	"The following brand is related" Segnale Light Amaranth 5B	Acna
	CI Pigment Violet 6 under "Aluminum lake"	*add*	Segnale Light Amaranth 5B	Acna
2769	CI Pigment Blue 1	*add*	Halopont Blue BGM	DuP
		add	Marine Blue A-8021	IMP
		add	Sicilian Blue A-7021, X-2758	IMP
2770	CI Pigment Blue 3	*add*	Danube Blue A-4382	IMP
2773	CI Pigment Blue 15	*add*	Franconia Blue A-4431	IMP
		add	Monarch Blue Toner X-2303, X-2763	IMP
		add	Monarch Blue Toner NC X-2371	IMP
		add	Monarch Blue NCNF X-2658	IMP
		add	Monarch Blue Toner NCNF X-2810	IMP
		delete	Monastral Fast Blue BFP	DuP
		add	Monastral Fast Blue BB, BFR, BGWD, BNF	DuP
	CI Pigment Blue 16	*add*	Monarch Blue G X-2480	IMP
2776	CI Pigment Blue 24	*add*	Peacock Blue X-1756	IMP
2777	CI Pigment Blue 27	*add*	CP Iron Blue all types	IMP
2781	CI Pigment Green 1	*add*	Avon Green A-4379	IMP
2782	CI Pigment Green 4	*add*	Bronze Green Toner A-8002	IMP
2783	CI Pigment Green 7	*delete*	Monastral Fast Green GFP	DuP
		add	Monastral Fast Green GFG, GFN GH, 2GWD, GX, GXB	DuP
		add	Sherwood Green A-4436	IMP
	CI Pigment Green 8	*add*	Chippewa Green X-1291	IMP
2786	CI Pigment Green 15	*add*	Sylvan Greens	IMP
		add	Vale Greens	IMP
		add	Velvet Greens	IMP
2787	CI Pigment Green 17	*add*	Chromium Oxide X-1134	IMP
	CI Pigment Green 18	*add*	Permanent Green X-1010	IMP
		add	Permanent Green X-1483	IMP
2817	CI Solvent Yellow 2	*add*	Enial Yellow 2G	Enia

Page	Colour Index Designation			
	lake"	*add*	Maroon Toner X-1455	IMP
2753	CI Pigment Red 81	*add*	Sicilian Rose Toner A-7143	IMP
		add	Rose Toner X-1143	IMP
2754	CI Pigment Red 83	*add*	Madder Lake X-686	IMP
2818	CI Solvent Yellow 5	*add*	Ext D&C Yellow No. 9	AAP, CCC, DC, KO, NAC, WJ
2819	CI Solvent Yellow 6	*add*	Ext D&C Yellow No. 10	AAP, CCC,DC,KO,NAC,WJ
2821	CI Solvent Yellow 14	*add*	Enial Orange I	Enia
		add	Oil Orange 2B	NAC
2831	CI Solvent Yellow 47	*add*	Luxol Fast Yellow TN	DuP
2835	CI Solvent Orange 7	*add*	Resin Scarlet 2R	NAC
2850	CI Solvent Red 23	*add*	Oil Red 3G	NAC
	CI Solvent Red 24	*add*	Enial Red IV	Enia
2883	CI Solvent Blue 37	*add*	Luxol Fast Blue ARN	DuP
		add	Spirit Soluble Fast Blue R	NAC
	CI Solvent Blue 38	*add*	Spirit Soluble Fast Blue 6G	NAC
2914	CI Fluorescent Brightening Agent 30	*add*	Delft White 2RW	NCF
		add	Enianil White R	Enia
	CI Fluorescent Brightening Agent 32	*add*	Delft White BS	NCF
		add	Enianil White B	Enia

VOLUME 3
Additions and Amendments

Page	Colour Index No.	
3033	for 12370*	Pigment
	read 12370	CI Pigment Red 112
3044	for 13220*	Direct Dye
	read 13220	CI Direct Brown 191 (*Reddish brown*)
3116	for 19110*	Acid Dye
	read 19110	CI Acid Yellow 122
3151	for 22190*	Direct Orange (*Bright reddish orange*)
	read 22190	CI Direct Orange 101 (new entry) (*Bright orange*)
3311	for 35785*	Direct Dye
	read 35785	CI Direct Red 194
3430	for 51305*	Direct Dye
	read 51305	CI Direct Blue 190 (*Bright blue*)
3444	for 53150*	Sulfur Dye (*Yellow*)
	read 53150	CI Sulfur Yellow 12 (*Yellow*)
3511	for 63610*	Acid Dye (*Blue*)
	read 63610	CI Acid Blue 69 (*Blue*)
3563	for 73660*	Vat Dye
	read 73660	CI Vat Black 35 (*Greenish grey-black*)
	under 73671	
	for Soluble in water	(bluish black)
	read Soluble in water	(pale yellow)
add		

(*concluded on page 63*)

199th Meeting
TECHNICAL COMMITTEE ON RESEARCH

THE 199th meeting of the Technical Committee on Research was convened at 9:00 am on Friday, September 11, 1959 in the East Room of the Sheraton-McAlpin Hotel, New York, NY, with the chairman presiding. The following were present:

Members

C A Sylvester, *chairman*
G S Wham, *vice chairman*
W D Appel
R F Caroselli
E M Eddington
F Fortess
P J Fynn
N F Getchell
H E Hager
E C Hansen
T H Hart
L L Heffner
V B Holland
W A Holst
C Hooper
A E Johnson
G O Linberg
L S Little
G J Mandikos
T D Miles
H E Millson
J D Mosheim
J E Norton
G P Paine
F A Prisley
G M Richardson
R E Rupp
B A Ryberg
J W Schappel
G M Smith
R B Smith
J G Stass
N A Truslow
R B Worner
C L Zimmerman

Others Present

C T Anderson
E Artim
W N Berard
H G Bryce
G M Kidder
T R Koffman
V S Salvin
H W Stiegler
F J Szurek (for J J Hanlon)
G R Thompson

After calling the meeting to order, Chairman Sylvester asked for approval of the minutes of the 198th TCR meeting as published. A motion to this effect was made and seconded. The motion was adopted.

COMMITTEE ON BLEACHING (RA34)———G R Thompson, staff liaison for the Committee on Bleaching, read the following report prepared by the Committee Secretary A F Chadwick:

"1) As the ASTM is reported to be working on whiteness of textiles, a check will be made to find out whether its objectives coincide with those of this Committee. An investigation will also be made on the possibility of grinding fabrics to obtain a more uniform whiteness reading.

"2) A noncotton determination test has been written up and will be circulated to all members of the Committee.

"3) An observer will be sent to the next meeting of the Committee on Water Absorbency to determine how this work relates to bleaching.

"4) The Harrison Test will give an indication of fluidity for two fabrics bleached by the same process but fails when two different processes are compared.

"5) Other possible tests which have been suggested for consideration include hardness in cloth, bleach demand of cloth and color permanence of cloth."

COMMITTEE ON DETERMINATION OF ODORS IN RESIN-TREATED FABRICS (RA68)——— Chairman P J Fynn reported as follows:

"The meeting was devoted to a consideration of data submitted by 14 laboratories on the results of five types of test run on 19 samples. The purpose was to discover which of the five tests was the best candidate for a method for a rapid determination of odor potential in resin-treated fabrics. Two methods appeared to be better than all the rest, the steam-tube method and the sealed-package method.

"Further work on the same and additional fabric samples will be made to select a single method to be presented as an AATCC test."

COMMITTEE ON DRYCLEANING TEST METHOD (RA43)———A E Johnson, Committee secretary, reported for Chairman R T Graham, as follows:

"The Committee moved to recommend to TCR, following a ballot of its own membership, to improve the drycleaning test AATCC 85-1957 (tentative) as follows:

1) Raise the temperature of the test from 85°F to 140°F,
2) eliminate the soap requirement, and
3) greatly simplify the pressing step, requiring only that the specimen be made smooth and free from wrinkles by hand ironing or pressing machine.

"These changes, to greatly improve the correlation of test results with commercial drycleaning conditions, were first approved at a special meeting last June. Editorial changes incorporating these changes were approved at the meeting yesterday. The Committee requests approval of TCR to proceed with the final balloting on these changes."

A motion was made and seconded that TCR be circularized by letter ballot on the proposed revision of AATCC 85-1957 (Tentative) as recommended by Committee RA43. The motion was adopted.

CONTINUOUS WOOL SCOURING PROCESSES (RA65)———The following report was presented by Chairman E C Hansen:

"The Committee has been inactive during 1958 as it was the concensus of opinion that, though "fadeable dirt" is still a problem in the woolen industry, little of real value could be added to our report published in the 2/24/58 issue of the *American Dyestuff Reporter*, entitled "Chlorophyll Contamination of Wool and its Effect on the Lightfastness of Dyed Shades", which fingerpointed chlorophyll as the main source of the fadeable dirt trouble and gave a reliable test method for determining the extent of the contamination and its probable effect on dyed shades.

"It was established that it is not necessary to use an expensive spectrophotometer for checking fadeable contamination in grease wools as a Jr Coleman or Beckman "B" photometer or a Kleff or Fisher colorimeter are satisfactory for the purpose. The photometers, being prism instruments, are more sensitive; the colorimeters are likely to vary over a band of 30mμ.

"As no new subject that is within the scope of the Committee has been suggested for investigation, it is suggested that it be put on an inactive basis as a Reference Committee."

A motion was made and seconded that Committee RA65 be placed on Reference status. The motion was adopted.

COMMITTEE ON WEATHERING OF TEXTILES (RA64)———L L Heffner, chairman, presented the following report:

"Nine individuals attended the meeting. Frank Rizzo, original chairman, who was instrumental in the formation of this Committee, was unanimously elected secretary of the group. Thus the Committee will continue to receive the benefit of Mr Rizzo's experience in this field.

"Mr Rizzo discussed the past activities of the Committee and described problems and possibilities for the future.

"There was a discussion of the variability of accelerated weathering machines and the need for standard-

izing them and improving their correlation with outdoor weathering results. To achieve these desirable objectives, the Committee agreed that the following problems should be investigated by the Task Groups within the Committee:

1) *Calibration of Accelerated Weathering Instruments.* Work begun in the first three years of this Committee will be continued in exploring the possible use of yellow methacrylate plates for this purpose. These were suggested as possible calibration devices by an ASTM group. Other methods of calibration will also be studied. Mr Rizzo will be the leader of the Task Group on Calibration. He will consult with the National Bureau of Standards on the problem.

2) *Relative Rates of Degradation of Various Textiles from the Different Accelerated Weathering Devices Now in Use.* Instruments which will be studied include the type X1A machine, the Twin Arc, with and without humidification, and the XW & XWR types. Various untreated textile fabrics of different fibers and corresponding finished and coated materials will be studied. A leader for this task group will be sought.

3) *Outdoor Weathering Studies.* These will be made on the untreated and treated fabrics referred to above at various locations. These are: New Orleans, La; Fort Lee, Va; Chicago, Ill; Natick, Mass; and Arizona. Other locations are also being considered. With the exception of the Arizona exposures, these studies will be made at no cost to the AATCC. Norbert Berard of the Southern Regional Research Laboratory of the USDA in New Orleans will lead this Task Group.

4) *Improvement in the Design of Accelerated Weathering Instruments.* As the work of the Committee develops, it was suggested, possible improvements in the machines may become apparent and indicated. This possibility will be considered a long-range goal of the Committee.

5) *Increased Participation of Various Interested Fiber Groups Within Industry in the Work of the Committee.* This will be encouraged in order to obtain as representative a group of textile interests as possible."

"It was suggested that the outdoor weathering study showed greater imminent promise of producing a standard procedure than some of the others being considered. This possibility will be carefully investigated."

COMMITTEE ON END-USAGE PERFORMANCE TESTS (RA44)———A E Johnson, chairman, reported as follows:

"The Committee reviewed the results of the two quarterly reports that have been made on the Interlaboratory Statistical Plan. It was agreed to prepare a display of the Plan for the Convention and to permit the chairman to publicly discuss the findings of the Plan with discretion, bearing in mind that these findings are highly tentative. It was agreed that the full meaning of these findings probably cannot be determined until the end of the year on completion of four quarterly reports. The first report contains data from seven cooperating laboratories: the second report, nine labs."

COMMITTEE ON IDENTIFICATION OF FINISHES ON TEXTILES (RA45)———Chairman T D Miles reported as follows:

"The purpose of the Committee is to develop qualitative test methods for the identification of finish on textiles. Our approach has been to develop separate methods for each class of finish rather than attempt one general method that would cover all finishes. A performance test such as determining the degree of wrinkle resistance or water repellency is used to determine the class of finish. This is followed by the chemical tests developed for that particular class. Methods for two classes—water repellents and wrinkle-resistant finishes—have been developed and are being published in the *Technical Manual.*

"The Committee is now attempting to develop methods for identifying antibacterial finishes. Producers of this type of finish have been very cooperative in submitting qualitative test methods. Yardney Chemix Corp has submitted a qualitative test for Eversan and Perma-Chem Corp has submitted a test method for its finish. One is a qualitative test for zinc while the other is a test for tin using dithiol.

"To determine whether the antibacterial finishes can be conveniently divided into groups, such as metal-containing or cationic materials, samples of commercial fabrics containing various antibacterial finishes have been obtained. Samples containing Cyana-Pure, Sanitized and Perma-Chem finish have been distributed to the Committee. Two of these finishes have been identified, using published methods. The Perm-Chem-treated fabric has shown the presence of tin while the Cyana-Pure fabric has shown the presence of antibiotic neomycin sulfate when a paper chromotographic test is employed. Samples of other commercial finishes are being distributed to the Committee."

COMMITTEE ON COLORFASTNESS TO LIGHT (RA50)———J E Norton, chairman, reported as follows:

"It is recommended that TCR approve a change in the carbon arc method of colorfastness to light which will permit tests only at a black panel temperature of 145°±5°F. This would eliminate the use of other black panel temperatures now permitted in the present method, which have been found to produce results which are not always in good agreement with natural light tests.

"This changes the second sentence of par 4 of Appendix I, which now states:

> 'Other Black Panel Temperatures, but not exceeding a maximum of 165°F (74°C) may be utilized if the Black Panel Temperature is stated in the report of the results.'

"It was the original intent of the Committee to permit the use of temperatures other than 145±5°F, but not exceeding 165°F, *if the Black Panel Temperature was stated in the report of results.* In actual practice, people have misinterpreted this or have failed to qualify in their reports that temperatures other than 145°F were being used. In general it has been found that results of tests made at temperatures above the 145±5°F black panel temperatures may in some cases, principally on some of the synthetics, cause an abnormally high rate of fading both in relationship to the blue wool standards and a specified number of standard fading hours as measured by the light-sensitive paper.

"To alleviate this situation it is recommended that the 4th paragraph be changed to read as follows:

> 'For textiles the machine should be adjusted so that it produces approximately 20 standard Fading Hours in 20 clock-hours of operation at a Black Panel Temperature of 145±5°F (63±3°C). This temperature is recomended because it has been found generally that fading rates at this temperature more generally agree with those of natural light tests.'

"The above would of course not preclude anyone from using any

black panel temperature that they might wish to use. It would, however, not permit them to say that tests run at other temperatures qualified under the new revision of AATCC Method 16A-1957."

A motion was made and seconded that a letter ballot on the proposed change in Test 16A-1957 be circulated to TCR. The motion was adopted.

COMMITTEE ON WASH AND WEAR (RA61)———C M Richardson presented the following report:

"This Committee's report will deal with four phases of activity as follows:

1) A statement of the objectives of the Wash and Wear Committee.
2) Proposed changes in Tentative Test Method 88-58.
3) Progress report on continuing developments.
4) Scheduling of subcommittee meetings.

"*Committee Objectives.* In view of the many questions that have arisen in the past concerning the scope of the activities of the Wash and Wear Committee, it became apparent that clear definitions of scope and objectives were required. There have been many statements such as the following:

'We are concerned that the Wash and Wear Committee is not interested in colorfastness.' 'The Wash and Wear Committee should be developing procedures for garments, not fabrics.' 'If the Wash and Wear Committee is going to work on pleats, it must develop procedures for introducing pleats in garments made from all fibers.'

"These comments have led us to agreement on the following points:

1) The greatest need is for methods for the evaluation of "wash-and-wear" characteristics of garments.

2) The complexity of the various characteristics influencing the "wash-and-wear" performance of garments, and the varying importance of these factors from one garment type to another, indicates that garment evaluation by one test, or by a fixed formula integrating several component tests, is an impossible goal.

3) The best approach is to provide a separate evaluation method for each property having major influence on the garment appearance after washing. With these tools the garment evaluator may measure each property, and determine for himself the combination most desirable for his particular garment.

4) Important items influencing garment appearances are:
   a) Fabric appearance
   b) Seam appearance
   c) Pleat and crease appearance
   Other items mentioned included padding, linings, and buttonholes.

5) Only those test areas important to "wash-and-wear" evaluation, which are not the logical concern of some other committee of AATCC are within the scope of the Wash and Wear Committee. For example, colorfastness, tensile strength, chlorine retention, etc, are important garment properties, but are not within the scope of the Committee.

"Based on these general principles it was resolved that the Committee's objectives are as follows:

'Resolved, that the objective of the AATCC Wash and Wear Committee be evaluation of the appearance of garments or consumer products and that the future work of the Committee be directed to the development of a practical, reproducible test method or methods to evaluate the "wash-and-wear" appearance of garments or consumer products, excluding those properties, such as colorfastness and dimensional stability as may properly be the function of other AATCC Committees.

'To accomplish this objective, the Wash and Wear Committee, through its chairman, has instructed the previously appointed subcommittees to work on essential characteristics of the "wash-and-wear garments and other consumer products in terms of:

Subcommittee A — Light and Evaluation
Subcommittee B — Pleats, Seams & Creases
Subcommittee C — Special Surface Effects

and any other characteristics not presently the concern of other AATCC Committees, with the instruction that the work of these subcommittees be directed toward the measurement of these factors in either/or all fabrics or garments or consumer products.

'The development of procedures for the preparation of garments, pleats, creases, seams and the like are not to be considered a function of the Wash and Wear Committee.'

"*Proposed Changes in Method.* Now turning our attention to the work of the subcommittees on methods, we present the following recommendations for changes in the Tentative Method 88-58 and ask approval from TCR to incorporate these in a revised test procedure:

1) It is proposed that the present method be revised to provide an alternate evaluation procedure using the Monsanto replicas along with the present photographs.
2) It is proposed that the scope of 88-58 be revised to include fabrics having special surface effects.

"We ask approval from TCR to make these changes.

"The Monsanto replicas are widely distributed and commonly used by many members of the Committee and others. They provide the viewer with a more easily interpreted comparison than that offered by the present photographs. In addition, a direct comparison of the given sample with the replica may be made in any light whereas only the light in which the photograph was made can be used when comparing with the photograph. This change will make the method more easily interpreted and will extend its usefulness.

"The proposal for a change in scope of the method to include fabrics having special surface effects based on interlaboratory tests that demonstrate that the method is adaptable to such fabrics.

"*Continuing Developments.* The immediate active program of the Subcommittee on Lighting and Photographs is aimed at obtaining improved lighting methods which will be applicable to garments as well as fabrics. It will not be long before this subcommittee will be offering improvements in the lighting procedure.

The Subcommittee on Pleats, Creases and Seams is developing, as its first project, replicas representing a spread in appearance of creases. As soon as available they will be used as the basis for an interlaboratory test. In addition, this test will demonstrate whether or not laundering procedures in Tentative Method 88-58 are satisfactory for measuring crease retention after laundering. A similar approach is being taken to the evaluation of seams.

"*Scheduling of Subcommittee Meetings.* As an experiment we have tried scheduling our subcommittee meetings in the same room immediately preceding our Committee meeting. This has met with excellent acceptance among our members and it is planned to continue this arrangement."

A motion was made and seconded that a TCR letter ballot be conducted on the proposals made by the Wash and Wear Committee. The motion was adopted.

COMMITTEE ON SOILING OF CARPETS (RA57)———Chairman J W Schappel reported as follows:

"During the past year the Committee on Carpet Soiling has continued its efforts and studies on the standardization and interpretation of carpet-soiling tests. A subcommittee, comprising four members, has concentrated on the evaluation of an interlaboratory test for service and accelerated soiling conditions. The test carpets involved eight fiber descriptions.

"Soiled-carpet samples for the interlaboratory tests were prepared by five members using test methods and procedures as practiced by their organizations. A visual study of these soiled samples shows a fair correlation of the soiling behavior at various locations, providing that grading of the samples is not attempted in a precise manner. Classification of the samples into three groups, namely good, fair and poor soil resistance, permits grading the fibers. Instrument measurements of reflectance and conversion of the data to Apparent Soil Values, offers another tool for appraisal but agreement with visual or jury rankings as good as desired.

"Accelerated soil tests applied to the carpets by three members using different procedures gave fairly good correlation with service tests. There is insufficient work in the area of accelerated testing to firm up a conclusion.

"As a result of the investigation to date, it is suggested that the Committee direct its efforts towards standardization in the following areas:

Service Testing. Thus far, the study has involved the examination of carpets soiled in four industrial locations and subjected to varying severity of service and maintenance conditions. Such a comparison will introduce error since the level of soil has been shown to influence the ranking of samples. In order to reduce these variables of the test, standardization of the test must be made on the basis of a given soil level for a control carpet. Since soil level influences ranking, a level should be chosen which is tolerable to the consumer.

Visual or Jury Appraisal of Soiling. Standardization of methods for grading soiled carpets by visual examination has proven effective in obtaining fair to good reproduceability. Visual grading methods are satisfactory for ranking soiled carpets in rather broad groups of soiling, such as good, fair, and poor soil resistance. Carpet samples which initially have a high yellowness level are difficult to appraise.

Instrumental Appraisal Methods. Data accumulated in this study have already shown the advantage of utilizing reflectance measurements for appraisal of soil level to show that carpet fibers have different soiling rates. Additional studies are required to show the best method for making measurements with specific instruments. The relationships of data obtained with different types of reflectometers or color-measuring instruments must also be studied. Methods for measuring the yellowness factor of unsoiled carpets is an area uninvestigated by the Committee. The Kubelka-Monk formula for determination of apparent soil was used for interpretation of reflectance measurements. Although the interpretation of data by this procedure appears to be satisfactory, several other procedures are given in the literature and should be evaluated.

Accelerated Laboratory Soil Tests. The examination of accelerated laboratory soiling tests has been superficial to date. At the moment, it appears to be most important that service testing and methods for measurement and appraisal of soiling be resolved before attention is given to accelerated soil testing. A satisfactory service test procedure will establish standards for the accelerated methods."

COMMITTEE ON COLORFASTNESS TO WASHING (RA 60)——— Chairman R B Smith made the following report:

"At the meeting of the Washfastness Committee, a display was shown of seven samples of material which had been subjected to a standard hand-wash procedure five times and the same material which had been given a series of tests in Launder-Ometer glass jars and steel tubes. The various samples were passed around and it was agreed that either the C or D tests in the Launder-Ometer glass jars gave a very good correlation with the five-hand-wash procedure. The Committee agreed to have the C method written up and to submit it to TCR for a vote. This method calls for the specimen to be washed in the glass jar for 45 minutes, in 200 cc of neutral soap solution, at 80°F with 10 steel balls.

"The staining produced by this method and in fact by all methods which gave anywhere near satisfactory color removal was slightly greater than that produced by five hand washings. This was judged to be in the right direction and to provide some additional protection for the consumer."

A motion was made and seconded that the proposed hand-wash test be circulated to TCR for letter ballot subsequent to favorable action by the Washfastness Committee. The motion was adopted.

COMMITTEE ON WATER RESISTANCE OF FABRICS (RA63)——— R K Worner, chairman, reported the following:

"The Committee on Water Resistance is working on two projects: one under the chairmanship of Mr De Marco, to study blotting-paper variables as used in the dynamic absorption test with a view to determining the importance of blotting paper specifications for this test; and the second project, under the chairmanship of Mr Slowinske, to determine the reproducibility of the regular and alternate dynamic absorption tests within and between laboratories, using the standard blotting paper with both laundered and unlaundered fabrics.

"The interlaboratory tests have been completed and an analysis of the data has been made by George Switlyk, chairman of AATCC's Statistical Advisory Committee. These results are being further studied by the subcommittee concerned. A report of these studies for publication is planned.

"It has been learned recently that the Alfred Suter Co is no longer manufacturing the Suter hydrostatic pressure tester for water resistance. There was some discussion of the need for another source of supply of this instrument.

"The first draft of the method for Water Penetration Resistance of Fabrics (AATCC Rain Test) was received, prior to submission for consideration as an ISO document.

"Membership requests for action by the Technical and Executive Committees included one application for membership, one for transfer of membership and one resignation."

COMMITTEE ON EVALUATION OF FINISHES FOR RESISTANCE TO STAINING AND SOILING (RA-56)———In the absence of H B Goldstein, Committee chairman, reports were made by chairmen of the two task groups.

C L Zimmerman, chairman of the Task Group on Wet Soiling, reported as follows:

"All of the cooperative washing tests of the Committee were reviewed. These tests consisted of home-laundry tests, commercial-laundry tests, and drycleaning tests. They were confined to resin-treated cotton fabric and were concerned only with the redeposition of soil during laundering. From the results of these tests, it appears that redeposition of soil during laundering is not a problem except when the fabric is washed under unusual conditions; for example, in hard water with unbuilt soap. The Committee feels that AATCC tests should not be set up to test fabrics under such unusual or impractical conditions. The work of the Committee relating to resin-treated cotton fabrics is to be written up and will ultimately be presented to the *American Dyestuff Reporter* for publication.

"The future work of this subcommittee will be concerned with the wet soiling of synthetic fabrics."

H G Bryce, chairman of the Task Group on Evaluation of Oil-borne Stains, gave the following progress report:

"Interlaboratory testing has been conducted by seven laboratories. Three test procedures are being evaluated:

1) Oil repellency—by oil-heptane mixtures
2) Oil wicking
3) Stain resistance to common oil-borne stains.

"Work to date has involved the use of a standard all-wool gabardine, which has been treated with a commercial oil- and water-repellent material. Primary concern to date has been to check consistency of results obtained by six laboratory groups, and also to determine degree of correlation between three test methods.

"Plans for the immediate future call for extension to other fabric types, especially those containing various fiber types and also fabric constructions particularly as regards to surface effects, such as flats, friezes, piles, etc. It is also planned to begin a study of detailed specifications of materials, as well as procedures for each test method."

COMMITTEE ON COLORFASTNESS TO PERSPIRATION (RA52)———The TCR secretary read the following report submitted by C H A Schmitt, chairman of Committee RA52.

"Since the last TCR meeting in April, the Committee has held two meetings. Our first meeting of organization took place on June 22nd. The initial objectives decided upon were as follows:

1) To clarify certain points in the instructions of the present test procedure.

2) To simplify the method if possible.

3) To develop a cheaper perspiration tester. Our reason for this stems from the fact that the main reason given by testing laboratories for not using the AATCC apparatus is its very high cost for a seemingly simple bit of equipment. At the present time, there are only 101 instruments used in the entire field of testing. This covers all textile plants, fiber makers, commission dyers, clothing makers, cloth consumers such as the Government and auto makers, universities and testing laboratories.

4) To continue the unfinished work of the previous committee with particular reference to checking lab procedure vs body testing.

5) To carry out interlaboratory testing of our method vs the methods of the British, Germans and the Swiss, which are presently before the ISO for consideration, and be in a position to make a definite report at the 1960 meeting of the ISO.

"At the meeting yesterday, various members reported on their preliminary work. A model of the new perspiration tester was exhibited, and a series of tests displayed to indicate excellent duplication of tests made in the regular AATCC apparatus. The new model is expected to be sold for $15-$20 per unit. Two units will be recommended—one for acid tests, the other for alkaline.

"The new model will also have the advantage of having constant pressure during the entire test whereas in the present apparatus the pressure decreases during the drying-out period.

"During the coming months, models will be provided for all members of the Committee to carry out the various phases of the program."

AATCC RESEARCH LABORATORIES———H W Stiegler, director of research, reported briefly on recent progress made by the AATCC Research Staff on the principal committee assignments.

Abrasion. Following the development of the first AATCC test method for abrasion resistance of textiles, AATCC 93-1959 (Tentative), the Abrasion Committee requested that work be started by the AATCC staff on the development of an edgewear abrasion test using the Accelerotor. Such a test would simulate the natural wear of collars, cuffs, seams, etc. Means have been developed for specimen preparation providing for edge-wear warpwise, fillingwise, or diagonally across warp and filling; and also for cutting specimens on a bias. A study of the relative merits of triangular and rectangular specimens, location of seams and folds and selection of the most desirable adhesives is under way. In the near future, a draft of a proposed method, restricted in scope, will be submitted to the Committee as a starting point for consideration and interlaboratory test.

Water Resistance. The staff has completed its assignments on the two projects currently underway by the Committee on Water Resistance of Fabrics. One project involves a study of absorption qualities of various blotters used in dynamic absorption tests with the ultimate objective of bringing Federal and AATCC specifications into agreement. The other project is a continued evaluation of 1) reproducibility of the Alternative Dynamic Absorption Test (AATCC 70A-1958 (Tentative)), and 2) correlation with the Regular Dynamic Absorption Test (AATCC 70-1952 (Tentative)). At the present time, the Committee, with the cooperation of George Switlyk, is making a statistical analysis of all results.

Washfastness. Seven laboratories participated in an interlaboratory test series of actual hand launderings on seven selected fabrics. On the basis of these actual hand launderings, the AATCC staff varied the following factors of the No. 1 Wash Test of AATCC 36-1957 (Standard) in an attempt to duplicate the effect of five average hand washings:

1) Liquor volume
2) Number of steel balls
3) Time
4) Rubber balls vs steel balls
5) Size of balls
6) Metal Tubes vs glass jars
7) Dyed fiber to multifiber ratio

The best correlation with five average hand washings was obtained in the Launder-Ometer with the following modifications of the No. 1 Wash Test:

200 ml instead of 100 ml soap soln.
45 min instead of 30 min.

Chlorine Retention. This is a continuing project sponsored by the Committee on Damage Caused by Retained Chlorine. Considerable data have been reported to the Committee by Staff Liaison Glen Kidder as a result of studies made on a number of factors including the following:

1) Optimum time of conditioning specimens.
2) Influence of pH of rinse waters.
3) Determination of available chlorine after every rinse.
4) Effect of the scorching phase alone.
5) Interrelationship of drying and conditioning.

This project will be continued according to directives from the Committee.

Wash and Wear. Because of the difficulty of evaluating colored fabrics, particularly prints, for appearance after laundering, a new idea was explored in the AATCC Laboratories. The idea involves the use of a projector and the Monsanto three-dimensional replicas. A swatch of the original fabric and a swatch of the laundered fabric are placed side by side in the projector. The original colored swatch is reflected onto the series of five replicas, one at a time, until a match is obtained with the reflection of the laundered colored swatch onto a smooth replica. The major difficulty encountered in this investigation has been the inability to locate a projector (on the market) which will give a life-size projection.

ADDITIONAL BUSINESS —— Mr Sylvester introduced Toby R Koffman, newly appointed Junior Research Associate at AATCC National Headquarters, to the audience.

The chairman requested that all Research Committee chairmen whose terms of office expire in January, 1960 submit their recommendations for their successors, in writing, as soon as possible. He further requested that all Research Committee chairmen, in cooperation with their respective committee members, review all test methods which they had developed prior to 1957 for possible need of revision in anticipation of publication in the 1960 *Technical Manual* and write up the current scope of their committees.

The next meeting of TCR will be held at the Sheraton-Atlantic Hotel (formerly the Sheraton McAlpin), New York, NY, on November 20.

The meeting was adjourned at 10:35 am.

Respectfully submitted,
GEORGE J MANDIKOS
Secretary

Colour Index Additions and Amendments——

(*concluded from page 57*)

Page		
3610		
77201	CI Pigment Orange 23 (new entry) (*Yellowish orange → Reddish orange*) CI Pigment Red 113 (new entry) (*Yellowish red → Bordeaux*)	
	Cadmium sulfide—mercuric sulfide CdS.xHgS obtained by coprecipitation of the sulfides and then calcining. The hue becomes redder and deeper the greater the HgS content	*Patents (Manufacture)* *BP 815328.* Johnson, Matthey & Co. *USP 2878134.* Imperial Color Chemical & Paper Corp.

add

3611		
77230	CI Pigment White 28 (new entry)	
	Calcium silicate	

VOLUME 4
Amendments

IBA IBA has ceased to be manufacturer of dyes and therefore all dyes made by it are to be deleted.

Page		
4002	*delete*	IBA Fabrica Inbra, Industria Brasileira de Anilinas SA, Sao Paulo, Brazil
4002	The entry for IMP should read—	IMP Imperial Color Chemical & Paper Corp, Glens Falls, NY, USA
4003	The entry for NAC should read—	NAC National Aniline Div, Allied Chemical Corp, New York 6, NY USA
4006	*delete*	Fabrica Inbra, Industria Brasileira de Anilinas SA, Sao Paulo, Brazil (IBA)
4007	for	Imperial Paper & Color Corporation, Glen Falls, NY, USA (IMP)
	read	Imperial Color Chemical & Paper Corp, Glens Falls, NY, USA (IMP)
4007	for	National Aniline Div, Allied Chemical & Dye Corp, New York, NY, USA
	read	National Aniline Div, Allied Chemical Corp, New York 6, NY, USA
4392	for	Perlamin ..... Vond
	read	Pernilan ..... Vond and transfer to p 4394

Membership Applications

NEW ENGLAND REGION
NORTHERN NEW ENGLAND SECTION
Transfer to Associate

Harry A Freedman—Text engr, Malden Ltd, Lawrence Mass.

Joseph P Geraghty—Lab tech, Ludlow Mfg & Sales Co, Needham, Mass.

WESTERN NEW ENGLAND SECTION
Senior

John T Wiser—Partner, Rockville Processing Co, Rockville, Conn. Sponsors: W C McBeath, J J Derrig.

Thomas H Bolcer—Dev chemist, Naugatuck Chem Div, US Rubber Co, Naugatuck, Conn. Sponsors: F J Szurek, C A Thompson.

Transfer to Associate

Hartley W Eastwood—Chemist, Pond Lily Co, New Haven, Conn.

Charles A Smith—Research chem, Monsanto Chem Co, Springfield, Mass.

RHODE ISLAND SECTION

Associate

Charles A Lamendola—Tech sales rep, Warwick Chem Co, Div Sun Chemical, Wood River Jct, RI.

Transfer to Associate

David A Morris—Finisher, Newport Finishing Corp, Fall River, Mass.

CENTRAL ATLANTIC REGION

METROPOLITAN SECTION

Senior

Edward G Bobilin—Salesman, Sandoz Inc, New York, NY. Sponsors: R E Elwell, H A Stauderman.

Gerald R Ferrante—Chemist, Shell Chem Corp, Union, NJ. Sponsors: M B Mitchell, R J Cullen.

Paul Harencak—Foreman, Eureka Printing Co, Clifton, NJ. Sponsors: E L Kelley, E Burke.

James W Monks Jr—Gen mgr, chem, Poughkeepsie Dyestuff Corp, Poughkeepsie, NY. Sponsors: R E Miller, W T Ambrogi.

Rubin Rabinowitz—President, Atlantic Chem Corp, Passaic, NJ. Sponsors: H A Stauderman, N A Johnson.

Oscar K Schwarz—Sales rep, Verona-Pharma Chem Corp, Union, NJ. Sponsors: I B Buchholtz, T K Merz.

Associate

David M Hegeman—Industrial rep, Morton Salt Co, New York, NY.

Ernest Nittelholzer — Secretary, Consolidated Bleaching Co, North Bergen, NJ.

Transfer to Associate

David S Bernzweig—Text chem, U S Testing Co, Hoboken, NJ.

George S Dominguez—Products dept, Geigy Dyestuffs, Div Geigy Chem Corp, Ardsley, NY.

Saunders W Gropper—Vice-pres, G G Knitted Fabrics Co Inc, New York, NY.

Albert McLuckie—Textile chemist & Colorist, Waldrich Co, Delawanna, NJ.

Joseph R Nosal—Chem, dyer, Narrowtex Corp, Passaic, NJ.

Howard M Sprock—Branch mgr, Geigy Chem Corp, Charlotte, NC.

William Tannenbaum — President, Gulf Color & Chem Co, New York, NY.

Philip D Turits—Sales mgr, Continental Chem Co, Paterson, NJ.

Transfer to Senior

Michael F Costello—Sales technician, Jacques Wolf & Co, Passaic, NJ. Sponsors: R E Miller, R P Monsaert Jr.

HUDSON-MOHAWK SECTION

Junior

Irwin J Smith III—Chemist, Surpass Chem Co, Inc, Albany, NY. Sponsors: N A Greenawalt, E S Dunlap Jr.

Transfer to Associate

Stanley J Sieckowski—Text engr, A D Juilliard & Co Inc, Div United Merchants & Mfrs Inc, New York NY.

NIAGARA FRONTIER SECTION

Senior

Walter H Kral—Dyer, The Perry Knitting Co, Perry, NY, Sponsors: G M Kidder, G J Mandikos.

John C Morris—Sales mgr, Verona Dyestuffs Ltd, Toronto, Canada. Sponsors: R Jesel, K A Lister.

Transfer to Associate

Thomas S Quealy—Text chem, Becco Chem Div, Buffalo, NY.

DELAWARE VALLEY SECTION

Senior

Edward G Hughes—Mgr, finishing machinery, Turbo Machine Co, Div Dexdale Hosiery Mills, Lansdale, Pa. Sponsors: H Robinette Jr, D Butterworth Jr.

Morton Santymire—Tech service rep, E I duPont de Nemours & Co, Inc, Wilmington, Del. Sponsors: G M Richardson, J W Lynch.

Joseph T Seawell—Director, tex res fellowship, Mellon Inst Industrial Res, Pittsburgh, Pa. Sponsors: H Gendreau, H A Stauderman.

Junior

Robert E Vellner—Tex chemist, Vellner Co, Philadelphia, Pa. Sponsors: T H Hart, W F Sheriff.

Associate

Felix A Buskey—Exec vice-pres, Althouse Chem Co, Reading, Pa.

Transfer to Associate

Richard H Brehm II—Supt, Brehm & Stehle, Philadelphia, Pa.

Maurice I Seifer—Chemist, Rohm & Haas Co, Phila, Pa.

Bob A Worley—Chemist, Joseph Bancroft & Sons Co, Wilmington, Del.

Edmund A Zavaglia—Graduate Student, University of Delaware, Newark, Del.

AATCC Calendar

COUNCIL, COUNCIL COMMITTEES, RESEARCH COMMITTEES
Nov 19-20 (Hotel McAlpin, New York, NY) Nov 19—Council Committees and Research Committees; Nov 20 (AM)—ECR, TCR; Nov 20 (PM)—Council
Jan 21-22 (Hotel McAlpin, New York, NY); Jan 21—Council Committees and Research Committees; Jan 22 (AM)—ECR, TCR; Jan 22 (PM)—Council

NATIONAL CONVENTIONS
Oct 6-8, 1960 (Sheraton Hotel, Philadelphia, Pa); Sept 28-30, 1961 (Buffalo, NY); 1962 (Southern Region)

DELAWARE VALLEY SECTION
Dec 4 (Philadelphia, Pa)

HUDSON-MOHAWK SECTION
Nov 20 (Jack's Restaurant, Albany NY); Jan 15, Mar 27 (Chelsea House, Tribes Hill, NY); May 20 (Ladies Night); June 24 (Annual Outing)

METROPOLITAN SECTION
Nov 20 (Kohler's Swiss Chalet, Rochelle Park, NJ); Jan 15, Feb 19 (Hotel New Yorker, New York, NY); Mar 18, Apr 22 (Swiss Chalet); May 20 (Ladies Night—Swiss Chalet); June, 1960 (Outing)

NIAGARA FRONTIER SECTION
Dec 11 (Annual business meeting, Buffalo, NY)

NORTHERN NEW ENGLAND SECTION
Dec 4 (Joint symposium with ASME Textile Engineering Div, Smith House, Cambridge, Mass); Jan 15 (Woodlawn Golf Club, Newton, Mass)

PIEDMONT SECTION
Jan 22-23 (Poinsett Hotel, Greenville, SC); Apr 2-3 (Hotel Robert E Lee, Winston-Salem, NC); June 3-4 (Outing—Ocean Forest Hotel, Myrtle Beach, SC); Sept 23-24, 1960 (Hotel Charlotte, Charlotte, NC)

RHODE ISLAND SECTION
Dec 4 (Annual Meeting—Johnson's Hummocks Grille, Providence, RI); Jan 29 (Johnson's Hummocks); Mar 25 (Providence Engineering Soc); Apr 29 (Student Night); June 24 (Outing—Metacomet Country Club; Sept 23, 1960 (Management Night); Oct 28, 1960 (Providence Engineering Society); Dec 2, 1960 (Annual Meeting—Johnson's Hummocks)

SOUTH CENTRAL SECTION
Feb 7 (Hotel Patten, Chattanooga, Tenn); May 13-14 (Outing—Riverside Hotel, Gatlinburg, Tenn); Sept 10; Dec 9, 1960 (Hotel Patten, Chattanooga, Tenn)

SOUTHEASTERN SECTION
Dec 5 (Atlanta Athletic Club, Atlanta, Ga); Feb 20 (Ida Cason Callaway Gardens, Pine Mountain, Ga); Apr 16 (Atlanta Biltmore Hotel, Atlanta, Ga); June 10 (Outing—Radium Springs Lodge, Radium Springs, Ga); Sept 17, Dec 3, 1960 (Atlanta, Ga)

WESTERN NEW ENGLAND SECTION
Dec 4 (Hartford, Conn)

News of the Trade

SAACI Holds 8th Chemical Sales Clinic

The 8th Chemical Sales Clinic, sponsored by The Salesmen's Association of the American Chemical Industry, Inc, was held September 28 at the Roosevelt Hotel, New York.

Speakers at the Morning Session were Jesse S Nirenberg, director of psychological services, TradeWays, Inc, who discussed "How to 'Get Through' to Your Customers and Your Boss"; Coleman L Finkel, executive vice president, Executive Communications, Inc, on "The Importance of Good Report Writing"; and J E Magoffin, vice president, Eastman Chemical Products, Inc, on "Management to Field Feedback—A Necessity to Successful Selling".

Arno H Johnson, vice president and senior economist, J Walter Thompson Co, discussed "Setting Our Sights for the 60's" at the Luncheon Session.

The afternoon session featured a talk by F W Steckmest, manager, Employee Communications Dept, Shell Oil Co, on "What Companies are Doing to Develop Managers", and a panel discussion on the topic "The Changing Role of the Salesman—Yesterday, Today, and Tomorrow". Moderator of the panel discussion was Ralph A Clark, vice president in charge of sales, J T Baker Chemical Co. Panelists were Sam L Brous, manager—marketing, Chemical Materials Dept, Chemical & Metallurgical Div, General Electric Co; V W Suellau, vice president, General Chemical Div, Allied Chemical Corp; and Ralph L Ericsson, vice president, Texas Butadiene & Chemical Co.

•

Ansbacher-Siegle Moves Harrison Facilities to SI

On November 9, those Textile Color Laboratories, office, and production facilities of Ansbacher-Siegle Corp located at 309 Sussex St, Harrison, NJ, were moved to the company's main plant at 92 Chestnut St, Rosebank, Staten Island, NY.

With the relocation, the final step in the consolidation of Sun Chemical's textile color activities is achieved. Modernized production and laboratory facilities, provided during the past year at Rosebank, went into operation on the 9th.

Adequate stocks of finished materials reportedly have been placed in the firm's warehouses.

NCC Official Cites Advances in Chemical Finishes

Advances in chemical finishing are bringing "wash-and-wear" cottons close to the ideal, "wash and dry this garment in any way you choose," Nelson Getchell, National Cotton Council, said at the Fabrics Maintenance Conference held in Atlanta earlier this month.

"This volume of cotton finished for crease resistance and easy-care properties will exceed two billion square yards this year, amounting to nearly 50 percent of all cotton broad woven goods." the Council's utilization research, technical section manager estimated.

A major advantage of chemically finished cottons stressed by Getchell was "refreshability." He said authorities agree that removal of perspiration and body odor from any fabric requires hot water washing.

"Because 'wash-and-wear' cottons are not thermoplastic and therefore not heat-sensitive, they can withstand a truly refreshing laundering," he said. Also, cotton is free from the problems of glazing or melting from ironing temperatures and from heat-set wrinkles or shrinkage in tumble drying.

"The technical problems of chlorine retention have been overcome," he said, and consumers can buy white and light-colored 'wash-and-wear' cottons with full confidence in their bleachability by normal methods used in home and commercial laundering."

An increasing volume of cotton, particularly high-style dresses, is now being sent to the drycleaner who has a reputation for careful handling of fine fabrics. Research by the National Institute of Drycleaning has shown that 'wash-and-wear' cottons dryclean even better than untreated cottons, according to Getchell.

He stresed that chemical finishes supplement the natural qualities of cotton which are appearance, durability and comfort, and that wash and wear is only the beginning of what we can expect from chemical finishing. He named stretch cottons and durable high-bulk cottons for winter wear as two possible finishing developments of the near future.

•

TAC to Distribute Sterox 21-K

Monsanto Chemical Company has announced that Textile Aniline and Chemical Co, Lawrence, Mass, has been appointed a distributor for Monsanto's Sterox 21-K, a product used in the textile industry for the fulling and scouring of wool and wool blends, for which Monsanto has made patent application.

Sterox 21-K is a newly developed product which is said to reduce chemical raw material costs, processing time and handling problems in textile mills. It also promotes uniform shrinkage and high tensile strength in fibers, Monsanto said.

Textile Aniline also will distribute Monsanto's complete line of surfactants for the textile industry as well as its own line of dyestuffs and related textile products.

•

Carbic-Hoechst Moves NE Office

Carbic-Hoechst Corp, 451 Washington Street, New York, NY, has moved its New England office and Pigment Division from 87 Weybosset Street, Providence, RI, to 129 Quidnick Street, West Warwick, RI, where Hoechst Chemical Corp is located.

•

Price Reduction in Epichlorohydrin

Shell Chemical Corporation on November 2 announced a three-cents-a-pound reduction in the price of its epichlorohydrin, effective immediately.

In back of the move are the company's soon-to-be-completed additional glycerine facilities which will use the new acrolein-hydrogen peroxide method instead of the one employing chlorohydrins, according to A W Fleer, general manager of Shell's industrial chemicals division. Completion of the new glycerine facilities will make available quantities of epichlorohydrin for the development of new markets, he said. This price reduction is the first step toward stimulating this development, he explained.

Epichlorohydrin presently finds its major uses as a primary ingredient in epoxy resins and as a component in the production of dyestuffs, detergents, insecticides, pharmaceuticals and other chlorinated products.

The price reduction cuts the per-pound price at point of delivery from 30 cents to 27 cents in tank cars; from 32.5 cents to 29.5 cents in CL lots, and from 34 cents to 31 cents in LCL lots.

Fatty acid salesmen from Emery Industries' Fatty Acid Sales Dept, Vopcolene Division, and Canadian subsidiary pose with staff members on the steps of Emery's Twitchell Memorial Laboratory in Cincinnati.

Emery Sales Meeting

"The Twitchell College of Chemical Knowledge" was the highlight of a sales meeting held September 21-23 by the Fatty Acid Sales Department of Emery Industries, Inc.

This comprehensive review of the chemistry and utilization of fatty acids was presented to salesmen of the Cincinnati department, Emery's Los Angeles Vopcolene Division, and Emery Industries (Canada) Ltd, Emery's Canadian susidiary. Site of the "College" was Emery's Twitchell Memorial Laboratories in Cincinnati, with members of Emery's Development and Service Department serving as the "faculty".

During the meeting, a pin, for 20 years service with the company, was presented to E W Sack of Emery's Cleveland office by A W Schubert, executive vice president. Mr Sack served with the Research and Manufacturing Departments prior to joining the chemical sales force in 1953.

•

New MCA Members

Two Canadian and one U S firm have joined the Manufacturing Chemists' Association. They are Dow Chemical of Canada, Ltd; Du Pont of Canada, Ltd, and Kay-Fries Chemicals, Inc, New York.

Dow Chemical of Canada has headquarters at Sarnia, Ont. Its principal products include petrochemicals, chlorine, caustic soda and ammonia. Du Pont of Canada, with offices at Montreal, manufacturing cellulose film, explosives, Freon and hydrogen peroxide. Kay-Fries Chemicals produces phthlate plasticizers, formaldehyde and organic intermediates.

The 87-year-old MCA represents more than 90 percent of the chemical production capacity in the US. Its membership now includes eight Canadian chemical firms.

Major Change in ISC Southern Sales Organization

Major changes in its southern sales organization were announced recently by International Salt Company.

Highlights of the changes include the opening of a new office in Charlotte, NC, the enlarging of an existing office in New Orleans, closing of offices in Atlanta and Richmond, and discontinuing of the southern sales division which had its office in New Orleans. Early in 1959, the company closed its Memphis office.

Company spokesmen state that Charlotte was selected for its new southern office because it is centrally located and in a growing area. It is also close to a large number of International Salt customers. This office will serve Florida, Georgia, the Carolinas and Virginia. The enlarged New Orleans office will be responsible for sales in Alabama, Arkansas, Louisiana, Mississippi, Tennessee and Texas.

Personnel changes made by International Salt in its southern sales reorganization include the following:

Charlotte Office—Robert H Leavelle, former district manager of the closed Richmond office, has become district manager of this new office. Other management positions in Charlotte include the appointment of Walter W Harris Jr, former sales engineer in the company's Atlanta office, to the position of industrial products supervisor.

New Orleans Office—Neil G Corbett, former district manager of the closed Atlanta office, has become district manager of the enlarged New Orleans office. Fred L Cormack has become industrial products supervsor in the New Orleans office.

Paul S Trible was recently appointed general sales manager of the International Salt Company. Mr Trible was formerly manager of the company's southern division which has been discontinued in the sales reorganization. His office is now at the company's administrative headquarters in Scranton.

•

LTIRF Gross Volume Exceeds $320,000

A gross volume of slightly over $320,000 for the fiscal year ending last June 30, compared with the previous year's gross of $194,000, was reported by Dorrance H Goodwin, executive director of the Lowell Technological Institute Research Foundation at the quarterly meeting of the board of directors Oct 16.

The Foundation, which completed its eighth year of operation, had $181,884.69 in unexpended funds as of the June date and, since that time, has signed contracts or received additional funds on existing contracts amounting to $166,312.76 in the areas of textiles, chemistry, electronics, paper, leather, plastics, and physics.

Re-elected to office were Harold W Leitch, president; Barnett D Gordon, MKM Hosiery Mills, vice president; Mr Goodwin, secretary and executive director; John H Pearson of Pearson and Pearson, treasurer. Also re-elected was the executive committee, Kenneth E Bell, chairman, Chapin A Harris, director of the LTI Graduate School, and Leo A Linden, Warwick Mills. Mr Leitch and Martin J Lydon, president of Lowell Tech, are ex-officio members of the executive committee.

In his report to the board, Mr Goodwin mentioned that 46 LTI faculty members were paid $50,452.77 for 10,835 hours of work for the Foundation during the year, supplementing the permanent staff of 25 which consists of administrators, engineers, and technicians. In addition, several students were employed.

A new program to sponsor the special research project of a faculty member was inaugurated during that year, which also saw establishment of an electronics section within the Foundation.

A testing section project on heat durability and heat shrinkage of yarns, under contract with E I duPont de Nemours & Co, Inc, resulted in DuPont's publication of a bulletin based almost entirely on the Research Foundation report.

Also attending the quarterly meeting were Samuel Pinanski, president of American Theatres Corp, Roland E Derby, Textile Aniline and Chemical Co, and Robert J Thomas of DuPont's Organic Chemicals Department.

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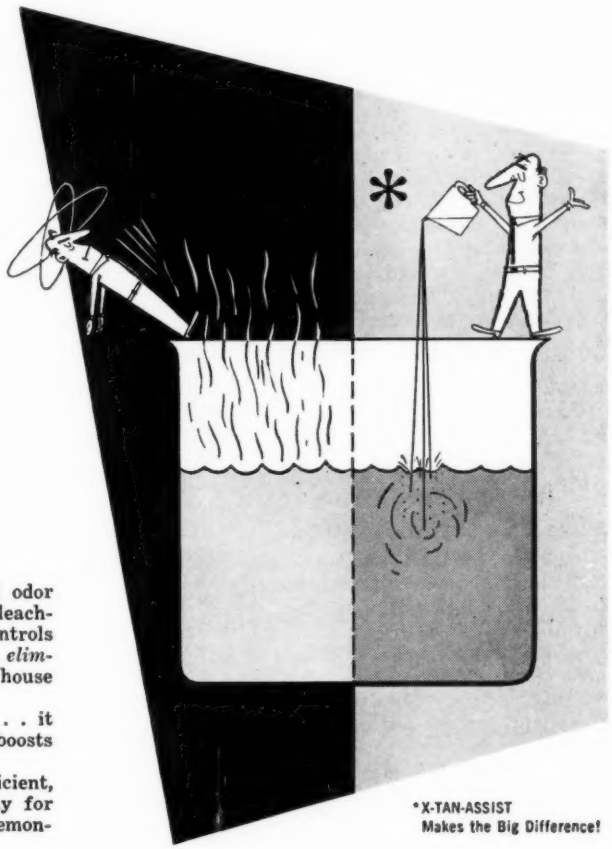

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CHEMICALS FOR DIFFICULT PROCESSING

New Dow Latex Plant Planned in Connecticut

A new plant to manufacture styrene-butadiene latexes will be built at Allyn's Point, Conn, The Dow Chemical Company announces.

Dow also will expand styrene-butadiene latex capacity of its Texas Division at Freeport.

Engineering for both expansions is underway.

The Connecticut plant will become a part of Dow's Allyn's Point Division, which manufactures two other major Dow plastics, Styrofoam and Styron. Production of latex there is scheduled for early 1961.

G J Williams, manager of plastics sales for Dow, said the new facilities reflect growing demand for latexes in textiles and other products.

The New England location is designed "to provide convenient supply and service to the northeastern states," he said.

He added that the expansion will provide a complete geographical pattern of latex production.

In addition to Texas and the new Connecticut plant along the Thames River, Dow produces styrene-butadiene and other latexes at Pittsburg, Calif, Sarnia, Ont, and at its headquarters plant at Midland Mich.

The company pioneered in the research and applications development of latexes. Since commercial introduction in 1948, Dow has announced 11 additions to latex production facilities.

•

James Hunter, Inc, Thomas Leyland Merge

Thomas Leyland Machine Co, Readville, Mass merged on September 26 with James Hunter, Inc, of Mauldin, SC. The consolidation places the manufacturing facilities of James Hunter Inc in its new Mauldin plant at the disposal of Leyland customers, and permits full utilization of the sales and service organization developed by the Southern subsidiary of the James Hunter Machine Co.

The Leyland company, which has served the textile industry for over 70 years, was purchased by the James Hunter Machine Company in 1948. James W Scholpp, who has been associated with the Leyland plant in Readville since 1936, transferred to the new location in Mauldin on September 28 as office manager of the newly merged companies.

The entire line of Leyland Expanders and Flexspools will be manufactured by James Hunter, Inc and made available to users in both the North and the South.

1959 DEXTER AWARD—L to r: Joseph B Evans, executive vice president, Dexter Chemical Colp; Prof Harry J Emeleus, president, The Chemical Society (London); Sidney M Edelstein, secretary, Div of History of Chemistry, American Chemical Society; Prof John Read, recipient of the 1959 Dexter Award

'59 Dexter Award to Read

John Read, professor of chemistry, University of St Andrews, Scotland, was presented the 1959 Dexter Award in the history of chemistry in London October 15.

The annual Award, administered by the Division of History of Chemistry, American Chemical Society, was established four years ago by Dexter Chemical Corp, New York, to "recognize noteworthy contributions to the advancement of the history of chemistry."

The plaque was presented to Prof Read by Sidney M Edelstein, secretary, Division of History of Chemistry, ACS, and the $500 prize by Joseph B Evans, executive vice president of Dexter Chemical Corp.

In 1956, as an outstanding historian of chemistry, Prof Read delivered the first lecture during the centenary year of William Henry Perkin's discovery of mauve, the first of the so-called aniline, or coal-tar dyes.

Prof Read, chemist, teacher, historian and writer, has continually stressed the value of chemistry as a humanistic subject of great educational value.

Prof Read was born in 1884 in Dorset. He is the first person outside of the United States to receive the Dexter Award. The first Award in 1956 went to Ralph E Oesper; 1957 to Williams Haynes and 1958 to Eva V Armstrong.

•

Construction Work to Begin at Union Carbide Plant at Brownsville, Texas

Construction work necessary to convert the recently purchased facilities at Brownsville, Texas, for use as a chemical plant will begin next April, according to a recent announcement by Morse G Dial, chairman of the board and chief executive officer of Union Carbide Corp. The announcemnt followed completion of engineering and economic studies conducted since the beginning of the year.

It is expected that about 500 construction people will be employed, and that the plant, when in operation, will employ about 200 people. Completion is scheduled for March 1961.

Mr Dial said that the Brownsville plant would become an important source of a wide variety of chemical solvents and intermediates to meet the needs of many industrial customers, particularly in the fast-growing textile, pharmaceutical, and surface-coating industries. Union Carbide Chemicals Co, a division of the Corporation, now produces more than 400 organic chemicals for industrial and consumer use in seven major plants throughout the country.

Hiring of permanent employees in the Brownsville area is expected to begin early in 1961. Union Carbide has not yet selected a contractor for the construction work.

Union Carbide Corporation announced last December that it had exercised its option to buy from Amoco the usable facilities remaining on the 309-acre tract near Brownsville. The option also included the 42-mile Weslaco-Brownsville natural gas pipeline. Union Carbide is leasing the property on a long-term basis from the Brownsville Navigation District.

Operations at Brownsville will be carried on by Union Carbide Chemicals Co and Union Carbide Olefins Co, both divisions of Union Carbide Corp.

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New Carbide Technical Center in Operation

A major link in the chain of facilities making up the Technical Center of Union Carbide Chemicals Co, division of Union Carbide Corp, at South Charleston, W Va is now completed, and the Center was officially opened October 21st.

The research-development-engineering complex is designed to bring the principal technical groups together in a modern center where their interrelated activities can be conducted most effectively.

With the recent completion of the Engineering Building, there are now five major functions housed in the Technical Center: Research, Development, and Engineering Departments of Union Carbide Chemicals Co, the Engineering Department of Union Carbide Olefins Co, and the Design and Construction Department. In addition, work on resin research and development is also done for Union Carbide Plastics Co. Thus, at the Center a project can be carried from the basic research stage through plant construction supervision.

The scope of activity at the Center ranges from theoretical studies on molecular structure and basic research in chemical reaction mechanisms, to pilot-scale production of new products and the subsequent engineering and design of commercial production facilities.

To continue the growth in chemicals as well as in all its divisions, the Corporation reportedly invested $70 million in research in 1958, and will invest about 10 percent more than this in 1959. Also, over the past decade, Union Carbide Corp reportedly has invested an average of $125 million a year in new production facilities, with $144 million estimated for 1959, more than half being for chemicals and plastics.

The Technical Center now includes three major buildings for the Research, Development, and Engineering Departments; two high-pressure laboratories with a total of 39 test cells; one chemical and two plastics/resins pilot plants; applications research laboratory; radiation laboratory; cafeteria; and supporting facilities.

With a gross total of 15 acres of floor space, a mail room handling 25,000 pieces of mail a day, a thousand-set telephone system, a cafeteria equipped to feed more than 2,200 researchers, and three libraries —the twelve buildings of the Technical Center form a nearly self-sufficient unit for its 2,200 scientists, engineers, and supporting personnel.

Other highlights of the Center include a highly automated air-conditioning system in the four-story Engineering Building; pretested laboratory modules in the Development Building based on the latest developments in laboratory design; luminous ceiling lighting in offices, hallways, and drafting areas; and IBM-computer report filing.

Though considered "complete," the Technical Center still has room to grow. Only 100 acres of the total 412-acre site are used at present. Careful planning has anticipated future extensions of the major buildings. Additional stories can be superimposed on wings of some buildings, and the ample size of the site permits the integration of entirely new structures within the Technical Center.

•

TTFC Accepts CGSB Standard Textile Test Methods 4-GP-2

The Textile Technical Federation of Canada, which coordinates the textile scientific and technological activities of the nine constituent groups in the Canadian primary textiles industry, has been offered and has accepted CGSB Standard Textile Test Methods 4-GP-2 "for its fullest use by the Canadian textile industry."

Announcement of acceptance of "Standard Textile Test Methods 4-GP-2," compiled by the Canadian Government Specifications Board's Committee on Textile Test Methods, came following a meeting of TTFC members in Ottawa on October 24.

•

Courtaulds Forms Two New Companies

Courtaulds Limited and its American and Canadian subsidiaries have formed jointly two new companies to seek and develop opportunities for expanding Courtaulds activities in industries outside textiles. The new companies are Courtaulds North America Inc, New York, NY, and Courtaulds North America Ltd, Montreal, Que.

Courtaulds is a world-wide producer of man-made fibers and textiles and also manufactures chemicals, petrochemicals, packaging films and products, plastics, paint and pulp. Courtaulds Limited has subsidiary and associated companies in 11 countries and is represented in 50 other countries.

Chairman of both new companies is J Albert Woods, formerly president of Commercial Solvents Corp. Stanley F Wagdin is president and chief executive officer.

P & S Opens Atlanta Office

Proctor & Schwartz, Inc has announced a further expansion in its services in the South with the opening of a regional sales office at 3222 Peachtree Rd, NE, Atlanta, Ga.

The new office will be under the direction of Denver D Cunningham, who has been appointed regional sales manager.

•

Allied Decals Name Plates

Allied Decals, Inc, 8014-60 Hough Ave, Cleveland, O, is offering a line of brilliant, colorfast, anodized, aluminum name plates for use as a trademark or insignia for all types of industrial machinery.

The name plates are custom-made in all sizes, designs, and in one or more colors. They can be supplied with various types of adhesives for application without screws or fasteners, and are said to be highly resistant to organic solvents. All colors and copy (printing) are sealed into the anodized plates, which are claimed to be highly scuff-resistant. They reportedly can be applied to any flat, curved, or angular surface.

General Calendar

AMERICAN ASSOCIATION FOR TEXTILE TECHNOLOGY
Dec 2, Jan 6, Feb 3, Mar 2, Apr 6, May 4, June 1 (Della Robbia Room, Hotel Vanderbilt, New York, NY)

AMERICAN COTTON MANUFACTURERS INSTITUTE
April 7-9 (11th Annual Meeting, Americana Hotel, Bal Harbour, Miami Beach, Fla); Mar 23-25 (12th Annual Meeting, Fontainebleau Hotel, Miami Beach, Fla)

AMERICAN SOCIETY FOR QUALITY CONTROL, TEXTILE DIVISION
Feb 18-19 (10th Annual Conference, Clemson House, Clemson, SC)

AMERICAN TEXTILE MACHINERY ASSOCIATION
May 23-27, 1960 (American Textile Machinery Exhibition, Auditorium, Atlantic City, NJ)

FEDERATION OF BRITISH INDUSTRIES
June 10-26 (British Exhibition of Industry, Technology, Science and Culture —Coliseum, New York, NY)

INTER-SOCIETY COLOR COUNCIL
April 11-12, 1960 (29th Annual Meeting—Philadelphia Museum College of Art, Philadelphia, Pa)

NATIONAL COTTON COUNCIL
Feb 8-9 (Annual Convention, Dallas, Texas); Sept 28-29 (9th Chemical Finishing Conference, Statler Hotel, Washington, DC)

PHI PSI FRATERNITY
April 28-30 (57th Annual Convention, Hotel Roosevelt, New York, NY)

SOUTHERN TEXTILE EXPOSITION
Oct 3-7, 1960 (Greenville, SC)

SYNTHETIC ORGANIC CHEMICAL MANUFACTURERS ASSOCIATION
Dec 2 (Annual meeting and dinner—Hotel Roosevelt, New York, NY)

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY, DELAWARE VALLEY SECTION
Mar 26 (3rd Philadelphia Conference of the Graphic Arts Industry—Benjamin Franklin Hotel, Philadelphia, Pa)

TEXTILE RESEARCH INSTITUTE
March 24-25, 1960 (30th Annual Meeting, Hotel Commodore, New York, NY)

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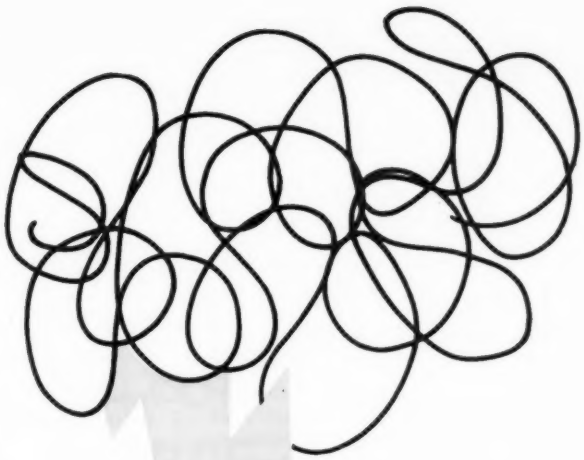

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• NAMES IN THE NEWS •

Sammon

Stein Hall & Co, Inc announced the election of *Roger B Sammon* as president of its Canadian subsidiary, Stein Hall Ltd, Toronto, on September 22nd.

In a shift of top officers of Stein Hall Ltd, *David McGill*, former president, became chairman of the board of directors; Mr Sammon moved into his new position from that of vice president and *Robert Strasser* became executive vice president.

•

Elmer F Schumacher has been appointed special chemical and plastics consultant to the Commonwealth of Puerto Rico.

Formerly sales director of Du Pont's Polychemicals Department in Wilmington, Del, Mr Schumacher will evaluate manufacturing expansion opportunities in Puerto Rico for U S chemical and allied producers.

•

Appointment of *Richard C Oswant* as manager of advertising for Columbia-Southern Chemical Corp, wholly-owned subsidiary of Pittsburgh Plate Glass Co, has been announced.

Mr Oswant succeeds *James C Plunkett*, who had served as manager of advertising for Columbia-Southern and Pittsburgh Plate's Fiber Glass Division, prior to his recent appointment as full-time advertising manager for the expanding Fiber Glass Division. Mr Oswant formerly served as editor of Columbia-Southern's *Chemicals* magazine during the past three years; however, he will continue as editorial director of the external publication.

Oswant

William W Huisking, Chas L Huisking & Co, Inc, recently elected president of the Drug, Chemical and Allied Trades Association, has announced the following committee chairmen who will be in charge of the Association's activities during the 1959-60 fiscal year:

Advisory Council ——— *Ralph A Clark*, J T Baker Chemical Co; *Bulletin*———*F M Schwemmer*, White Laboratories Inc; *Finance*———*W J Schieffelin III*, Schieffelin & Co; *Legislative*———*William J Quinn*, Chemical Div, Merck & Co, Inc; *Membership* ——— *Evan R Spalt*, Ortho Pharmaceutical Corp; *Membership Service* ——— *Robert H Kampschulte*, Celanese Chemical Co; *Nominating*———*Ralph A Clark*, J T Baker Chemical Co; *Operation Retort*———*Paul J Cardinal*, Hoffman-LaRoche, Inc; *Publicity*———*Paul Klemtner*, Paul Klemtner & Co, Inc; *Tariff* ——— *Norman C Babcock*, Union Carbide Olefins Co; *Time & Place*———*Griffin Crafts*, J W Wilson Glass Co, Inc; *Trade Association Activities*———*J David Hayden*, American Home Products Corp; *Section Activities*———*James Day*, The Dow Chemical Co; *Fall Luncheon*——— *Robert E Horsey*, Givaudan-Delawanna, Inc; *Winter Luncheon*——— *Paul E Weber*, Chemical Sales Div, Chas Pfizer & Co, Inc; *Annual Dinner* ——— *Wm J Schieffelin III*, Schieffelin & Co, Inc; *Spring Luncheon*———*Fred A Coe Jr*, Burroughs, Wellcome & Co (USA) Inc; and *Annual Meeting*———*Paul J Cardinal*, Hoffman-LaRoche, Inc.

•

The appointment of *Arthur N Green* and *Paul E Stubbe* as industry marketing assistants in Atlas Powder Company's chemical sales department has been announced.

Mr Green formerly worked out of the company's New York chemical sales office with his headquarters in Boston. Mr Stubbe came from Atlas' St Louis chemicals sales office.

•

Girard R Adams has been appointed a sales and technical representative by Continental Chemical Co, Paterson, NJ. Mr Adams was previously a sales representative for the Antara Chemicals Division of General Aniline & Film Corp. His territory will include the Metropolitan New York area, New Jersey and Eastern Pennsylvania.

O'Connor

Ken W O'Connor has been named resident sales representative in the Southwestern District for the Michigan Alkali Division of Wyandotte Chemicals Corp. The appointment became effective October 1.

Immediately prior to joining Wyandotte, he was a sales representative for the Tubular Lining Corp.

Mr O'Connor's territory includes Texas and New Mexico. He will reside and operate from his home in Houston.

•

Crayton K Black has been named manager of the trade relations section of the Du Pont Company's Dyes and Chemicals Division, succeeding *Paul K Lawrence*, who retired from the company at the end of September.

Dr Black was director of the Dyes and Chemicals Division's Technical Laboratory for the last five years and has been assistant manager of the trade relations section since May.

•

Apex Chemical Co, Inc, Elizabeth, NJ, has appointed *Gerson Hermann* to its laboratory staff. Mr Hermann was previously chemist and technical director at Raytex Chemical Co, Eastern Color and Chemical Co, and Alrose Chemical Co.

•

Billy E McCardle has joined the Dewey and Almy Chemical Div, W R Grace & Co, as sales representative for organic chemicals in the Carolinas and southern Virgina.

McCardle was formerly with Southern Sash Sales and Supply Co, Sheffield, Ala.

McCardle

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Unifog Spray Process

Development of a new process for spraying finishing agents on textiles has been announced by the Du Pont Company's Dyes and Chemicals Division. According to Du Pont, the process, which it is offering to the textile industry, produces some finishes superior to those obtained with conventional padding operations but should prove to be more versatile, more economical, and faster.

Termed the Unifog spray process, it substitutes a series of compact, lightweight "misters" for the usual padding rolls. The spray process reportedly eliminates the need for drying equipment in some finishing operations, cuts wastage of chemicals, and in some cases results in a more uniform deposit of finishing agents. Fabrics finished by the Unifog process have shown a generally fuller hand, with better sewability, it is claimed.

Experience so far, the company said, has shown fabric can be spray-finished at considerably higher speeds than with conventional padding and drying equipment. Tests also indicate the equipment is adaptable to aqueous solutions, dispersions, emulsions or molten solids and can be used to apply many types of textile finishes to either or both sides of fabrics. Finish changes can be made very quickly.

While most of the applications so far have used air as the misting medium or propellent in the spray apparatus, steam may prove to be a more satisfactory and economical atomizing medium, Du Pont engineers said. Use of steam as a propellent in certain spray applications, they noted, is disclosed in Du Pont's U S Patent 2,511,797.

Flexibility of the Unifog spray process is "intriguing" they say. Not only is it said to be possible to shift from one finishing mix to another quickly, but the process reportedly lends itself to treatment of a wide variety of fabrics including lightweight and heavyweight flat woven goods, toweling, and knit goods. Such materials can be entered dry, partially dry, or even wet and be assured of even uniform impregnation, it is claimed.

Radiant-heat drying reportedly works well with the process, producing a somewhat different finish than that obtained when the same fabric is dried in a hot-air dryer. This may be attributable to the controlled migration of the finish under radiant-heat conditions, Du Pont explains, adding that use of radiant-heat dryers may be more attractive for spray-processed fabrics because considerably less drying is involved.

Initial cost of the "misters" is said to be lower than that of conventional padding equipment, and the small, lightweight apparatus can be installed easily in existing equipment space, even lending itself to support from overhead beams. It is claimed that maintenance costs are negligible, and some expenses such as turning down of pad rolls are eliminated. Operational costs also are lowered because of reduced heat consumption.

The new Du Pont spray process reportedly makes economical use of the finishing mix because the solution which does not strike the fabric can be recovered and returned to the supply tank. In addition, the mixture in the supply tank can be used almost completely.

The Unifog spray system is said to permit coating only one side of a fabric, thereby reducing chemical cost. In selected cases, it might be used to apply a stiffening resin, for example, to one side of the fabric and a softener to the other.

Spray application reportedly has helped decrease the drying bottleneck in several mills because only about one-third as much water is involved as in padding operations, and the speed of the goods through the dryer has been at least doubled. There also are indications that speeds in the compressive shrinking machine can be increased.

Development of the Unifog spray process was a cooperative venture, Du Pont said, with the Binks Manufacturing Company of Chicago designing the spray equipment to Du Pont specifications and Crystal Springs Bleachery of Chickamauga, Georgia, assisting in putting the process to work on a mill scale.

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Polimize Dyeing Process

Several cotton yarn dyers are now using the new Althouse Polimize dyeing process, according to Felix A Buskey, executive vice president of Althouse Chemical Co.

Developed by C Scott Althouse and his staff after more than two years of research, the Polimize dyeing process is said to produce fabrics which are soft to the touch and to reduce labor and material costs by eliminating the need for added softeners. Textile manufacturers are said to be reporting increased efficiency in both knitting and weaving of Polimized yarns.

Althouse claims that, because the finish is a thoroughly reacted one, and thus becomes a part of the fiber itself, the Polimized-processed yarn becomes synonomous with fast colors.

Finished yarn tested in the Althouse Research Applications Laboratory reportedly met the high standards of premium dyes, and repeated washings at 160°F with modern laundry detergents showed excellent results. Lightfastness properties are said to be retained after 40 hours and more.

•

Pliolite Latex 140

A new synthetic resin latex designed for use in upholstery backings, textile sizings, adhesives, textile printing inks, and carpet backing, has been developed by the Chemical Division of The Goodyear Tire & Rubber Company.

Called Pliolite Latex 140, Goodyear's new product was introduced at the opening of the 1959 AATCC Convention last month in Washington, DC.

As a noncuring backsizing, the new latex reportedly exhibits outstanding heat and light aging properties. At the same time, it is a highly flexible latex that can be compounded to meet a wide variety of conditions.

Containing a nonstaining antioxidant system, Pliolite Latex 140 is a water dispersion of a styrene-butadiene copolymer. At room temperature, it reportedly forms tough, flexible films with low odor, excellent clarity and adhesion, high pigment binding and mechanical stability.

High styrene-reinforcing latices can be used with the new latex to improve physical properties, it is stated. Excellent stability of the latex reportedly makes it possible to use high loadings and high total solids, thus reducing batch volume and heat requirements for drying.

A sister product, Pliolite Latex 141, also was introduced by Goodyear at the Convention. This latex, without an antioxidant system, will be made available to users who prefer to add their own particular antioxidant. In all other properties and application possibilities, the two new Goodyear latices are identical.

Colorplast Machine

With a view toward the success of the Colorplast Machine in Europe, where there are a number of them in commercial production, Eugen Bellmann GmbH, Hagen-Haspe, West Germany, has been presenting the machine to the American hosiery industry.

The Colorplast Machine is designed to dye and finish ladies' hose in three different stations: in the first station, the stockings are pulled off and on the form; in the second, lots of thirty pairs are preboarded, cleaned and dyed; and in the third, they are rinsed, finished and dried.

A manual operation by the three operators is the pulling on and off, whereas the other operations are done automatically by the machine. For each lot of 30 pairs, an apportioned amount of dyeliquor is sprayed on the stockings at temperatures above boiling point, ie, under pressure, and circulated by means of a pump. The welt and seams reportedly are penetrated by the dye in the same manner as in a conventional dyeing process. The temperatures are regulated at a thermostat. In cases where it is necessary for a good matching of multifilament welt or heel or toe and monofilament hose panel to set such low temperatures that the setting effect is not sufficient, it is said to be possible to effect a short aftersetting with saturated steam in the same station.

In the combined finishing and drying equipment, the stockings are rinsed, in order to remove any residue of dyestuff that may be on the surface of the thread and to apply the finish at the same time. Added to the rinsing liquor are the chemicals required by the hosiery manufacturer to obtain special effects, eg, dulling, soft or hard hand, antisnag treatment, etc. With a machine length of about 17 ft and a machine width of about 10 ft, production is said to be 400 doz pair of 15-den stockings per eight hours in a space of about 170 sq ft. In case of thicker hose, the production is a bit reduced, 250 doz in case of crimp material 2 x 40 den.

It is claimed that dyeing is only effected according to formula; subsequent shading is not necessary. Redyeing reportedly presents no difficulties.

A special feature of the Colorplast Machine is its flexibility. It is claimed that shades can be regulated without difficulty and without great loss of production, and that lots of 20 doz can be treated as easily as very big lots. The machine can be compared with a simple preboarding machine on which all other operations, such as cleaning, dyeing, finishing, drying, are carried out. The cost of steam and power is said to be about the same as in preboarding.

BOOK REVIEW

Friction in Textiles

H G Howell, K W Mieszkis, and D Tabor
Textile Book Publishers, Inc, New York (1959)
263 pp; $6.75

This book fills a serious gap in the literature on friction of textile materials. Friction, something we encounter every day, most of us understand poorly. "Friction in Textiles" attempts to overcome this deficiency by presenting a great deal of the most recent experimental evidence and theory on friction.

The book is divided into three parts. Part I, written by D Tabor (who has also coauthored an outstanding book on friction, "The Friction and Lubrication of Solids," Oxford, Clarendon Press) concerns the theory of friction and lubrication. Much of the information presented here would certainly be unknown to the average technologist and in itself is well worth studying. One of the most intriguing photographs is that of an autoradiograph showing that silver, as it slides over a flat surface of polyvinyl chloride, can be plucked out and deposited on the polymer. The friction of plastics and fibers is also presented, followed by a thorough discussion of the mechanism of lubrication.

Part II is written by H Howell, who has done excellent work in the friction of textiles, and by K W Mieszkis of the Research Department, British Nylon Spinners, Ltd. The various aspects of friction in textile processing are given in this section. Friction in wool, spinning, winding, the conversion of yarns into fabrics, the effect of interfiber friction on the strength of tire cord, and in fabrics is very well presented.

Many questions remain to be answered in textile friction; one especially, as pointed out by Mieszkis, on the relation of chemical composition and structure to the lubricating properties of textile oils, is long overdue.

The third part, by Howell and Mieszkis, presents test methods, the measurement of friction of yarns and fibers, control and measuring of tension, and the measuring of abrasion. These are set down in some detail.

The book is well written and organized and should find a great demand in textile colleges and in the industry. It is certainly a pleasure to recommend it to all persons interested in the frictional phases of textiles.—VL.

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Handbook of Textile Fibers

J Gordon Cook
Merrow Publishing Co, Ltd
276 Hempstead Road, Watford Herts, England
XXV plus 421 pages; 4-3/4 x 7-1/4; 15/

This volume contains a concise presentation of the source and properties of textile fibers. The author has sub-divided the work in two parts. Part I, 145 pages, deals with the natural fibers. Part II, 272 pages, deals with man-made fibers. Part II is excellently organized and presents a comprehensive picture of the composition and some pertinent properties of man-made fibers.

The reader may feel that the natural fibers have been minimized in favor of the man-made fibers. However, a careful examination shows that the pertinent material is adequately covered for a book of this type. The inclusion of a plot of stress vs strain characteristics for many of the fibers should be of value. The listing of man-made fibers by type and tradename includes fibers in pilot-plant and full-scale production the all parts of the globe. This should be of considerable value since the last such English language compilation in book form was published in 1953.

The author and publisher are British, and for this reason some of the terminology, particularly that used in Part I, may be a little confusing to the American reader. However, where International Organization for Standardization terminology has been established, the author follows these recommendations.

This is an excellent review of the source and selected properties of natural and man-made fibers.—FK

Abstracts

The Effects of Wear and Laundering on the Wrinkling of Fabrics

Wilkinson, P R and Hoffman, R M, *Textile Research J* 29, 652-60, August, 1959

Freedom from wrinkles is one of several necessary and desirable properties of a good "wash-and-wear" garment. In a garment, freedom from wrinkling depends upon the ability of the fabric to recover from bending deformations which occur during wear and laundering.

Fibers and fabrics vary in their inherent ability to recover from deformation. In addition, however, external factors play an important part.

During wear, the important variables are the ambient temperature and humidity and the activity of the wearer. Fabrics next to the wearer's body are exposed to temperatures of 90-95°F, to relative humidities of 60-95%, and the pressures up to two psi for various times.

During laundering, the important conditions are temperatures of 100-140°F while wet, pressure of one to two psi, and deformation times of four to six minutes, followed by temperature changes which may either *set* wrinkles in or remove them as in tumble drying.

The mechanical agitation during washing does not cause wrinkling; it actually assists the fabric to recover from wear wrinkles. Centrifugal spinning to remove water is the major cause of wrinkling in automatic washing machines. The use of warm water is desirable during agitation but undesirable during spinning.

Data and information on the above factors can be used in the design of laboratory tests which can currently predict the performance of wash-wear fabrics. Laboratory tests must employ realistic conditions in order to give results which can be correlated with actual use. Several new and modified test procedures which are being developed along these lines are described.

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The Dyeing of Polyester Fibers and Blends

Partridge, H W, *J Soc Dyers Col* 75, 373-8, July, 1959

This paper is confined largely to the dyeing of yarns and hosiery. The author refers principally to Terylene but states that the dyeing properties of Dacron are "closely similar if not identical".

Owing to the absence of chemically reactive groups from Terylene, the classes of dyes available for its coloration are in general limited to the disperse dyes and certain azoic combinations, but vat and pigment dyes may also be used.

Although the equilibrium absorption capacity of Terylene for disperse dyes is greater than that of nylon, their rate of diffusion into the fiber is very much lower, and dark colors of adequate fastness cannot be obtained by normal dyeing methods. By selecting the most rapidly diffusing disperse dyes, however, it is possible to dye light to medium depths at 100°C in conventional dyeing machines. The wetfastness is much higher than that of the same dyes on nylon. This method is quite suitable for many of the lighter hosiery colors. For men's half-hose, it is necessary to use carriers in order to obtain the deeper colors. A wide variety of organic compounds are capable of acting as carriers, but the majority of these compounds have disadvantages which make them unsuitable. Two of the most effective carriers for general purposes are diphenyl and ortho-phenyl phenol.

The rate of diffusion of disperse dyes into Terylene increases rapidly with increase of temperature, and dark colors can be dyed with comparatively slowly diffusing dyes in normal dyeing times if dyeing is carried out at 120-130°C. In addition to improved color yield, this method results in better leveling and higher wetfastness. Several machines designed for high-temperature dyeing are described.

A limited range of azoic combinations are suitable for dyeing Terylene. A number of bases can be used in conjunction with 3,2-hydroxy-naphthoic acid, applied as dispersions at the boil, and subsequently diazotized and coupled, and the range may be extended by the use of selected arylamides of this acid applied at 130°C. Full details of this method of dyeing are given.

Vat dyes are not applicable to Terylene by normal alkaline leuco methods, but selected vat dyes may be applied at 130°C in unreduced pigment form in a manner similar to that used for disperse dyes. Dispersions of acid-leuco vat dyes may be similarly applied, and oxidized later.

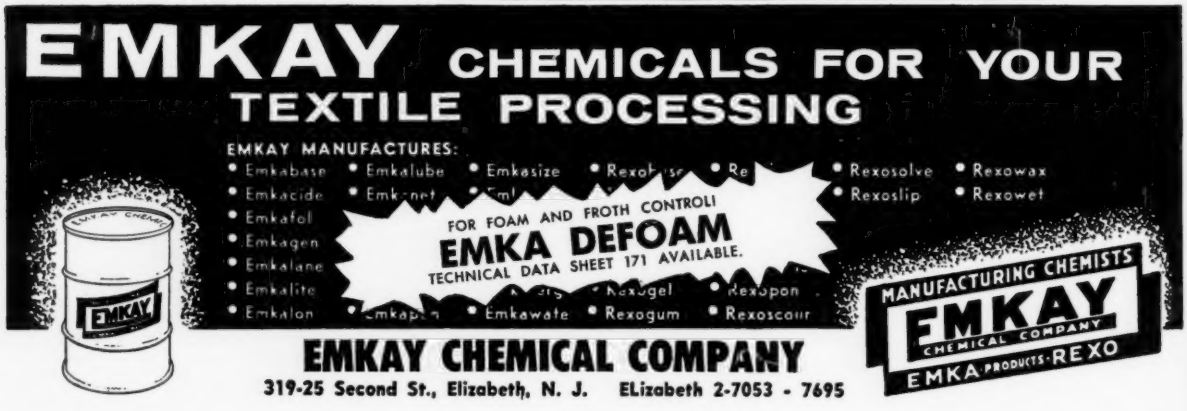
Pigment dispersions may also be padded on to Terylene fabric in conjunction with appropriate binders, and fixed by baking.

Terylene/wool yarns may be dyed in cheese form with selected disperse dyes that produce minimum staining of the wool. Light shades are applied in a one-bath process, with addition of milling acid or metal-complex wool dyes. Heavy shades require two baths.

Terylene/cotton yarns are dyed on cheeses with selected disperse dyes for the Terylene, and vat dyes for the cotton in a fresh bath.

The dyeing of Terylene/nylon blends in the form of crimped or stretch yarns for men's hose is also described.

Six references to the literature are cited.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